Canovision 8

SERVICE MANUAL

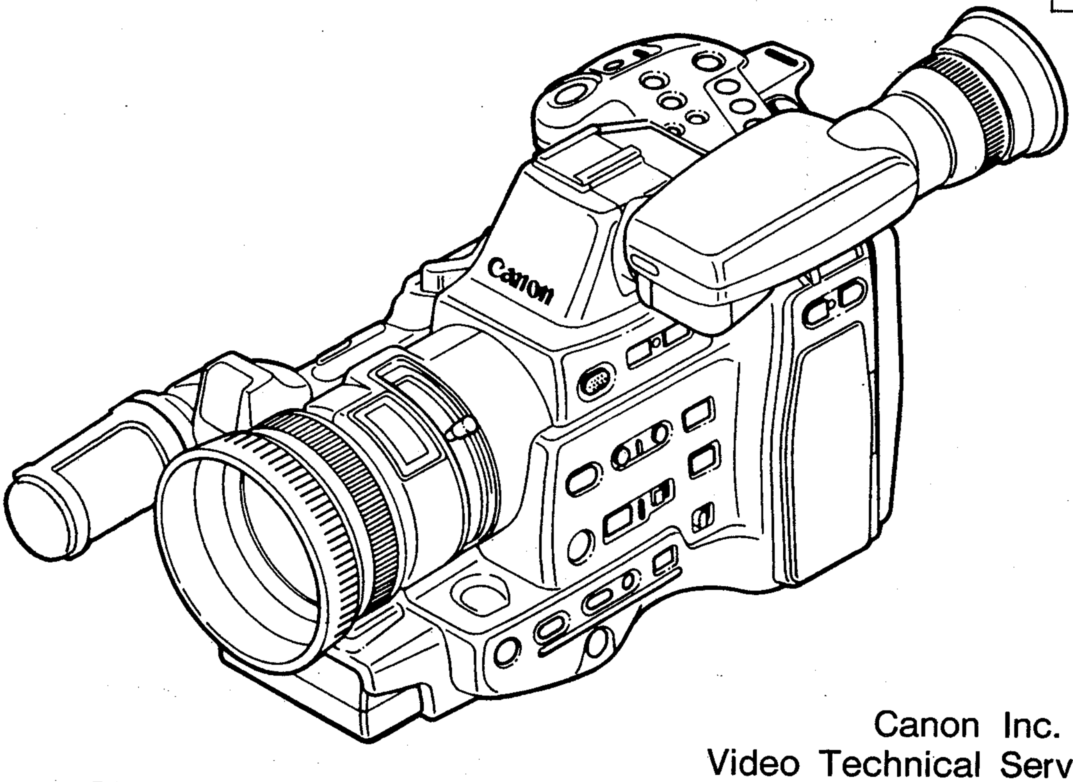
A2HiE,F

(REF. NO. D15-2730,2770)

8mm Video Camera & Recorder

PAL

F-PAL



Canon Inc.
Video Technical Service Dept.
First Edition: Nov. 1990

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SAFETY PRECAUTIONS

The following precautions should be observed when servicing.

1. Since many parts in the unit have special safety-related characteristics, always use genuine CANON replacement parts.

   Especially critcal parts in the power circuit block should not be replaced with other makes.

   Critical parts are marked with ⚠ in the schematic diagrams.
2. The primary source of X-ray radiation in this viewfinder is the picture tube. The tube used in the viewfinder is especially constructed to limit X-ray radiation emission. For continued X-ray radiation protection, the replacement tube must be same type as the original, CANON approved one.
3. When servicing, observe the original lead dress. If a short circuit is found, replace all parts which have been oberheated or damaged by the short circuit.
4. After servicing, see to it that all the protective devices such as insulation barriers, insulation papers shields are properly installed.
5. After servicing, make the following leakage current checks to prevent the customer from being exposed to shock hazards.

5-1 Leakage Current Cold Check

1) Unplug the AC cord and connect a jumper between the two prongs on the plug.
2) Measure the resistance value, with an ohmmeter, between the jumpered AC plug and each exposed metalic cabinet part on the equipment such as screwheads, connectors, control shafts, etc. When the exposed metalic part has a return path to the chassis, the reading should be between 1MΩ and 5.2MΩ. When the exposed metal does not have a return path to the chassis, the reading must be ∞.

5-2 Leakage Current Hot Check

1) Plug the AC cord directly into the AC outlet. Do not use an isolation transformer for this check.
2) Connect a 1.5KΩ 10 watt resistor, paralleled by 0.15μF capacitor, between each exposed metalic parts on the unit and a good earth ground such as a water pipe, as shown in the figure below.
3) Use an AC voltmeter, with 1000Ω/volt or more sensitivity, to measure the potential across the resistor.
4) Check all exposed metallic parts of the cover (Cable connection, Handle bracket, metallic cabinet. Screwheads, Metallic overlays, etc), and measure the voltage at each point.
5) Reverse the AC plug in the AC outlet and repeat each of the above measurements.
6) The potential at any point should not exceed 0.75V RMS.

   A leakage current tester (FLUKE MODEL: 8000A equivalent) may be used to make the hot checks.

   Leakage current must not exceed 0.5 milliamp.

   In case a measurement is out side of the limits specified, there is a possibility of a shock hazard, and corrective action must be taken before returning the instrument to the customer.

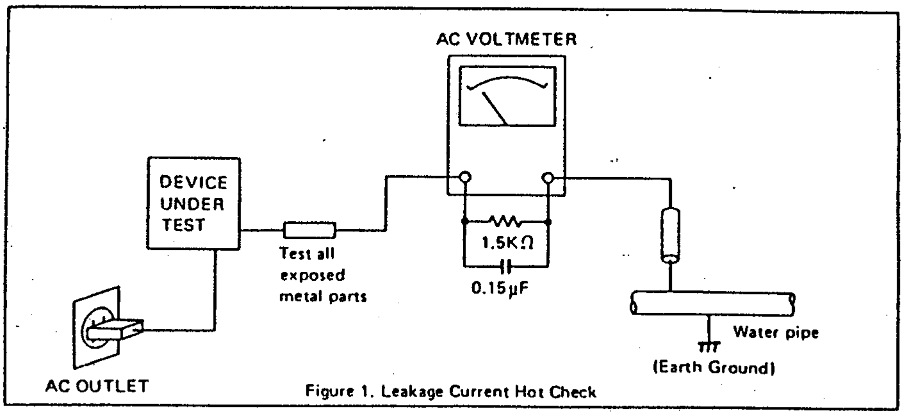

Figure 1. Leakage Current Hot Check

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CHAPTER I. GENERAL DESCRIPTION OF PRODUCT

1. Product Overview

The Model A2 Hi camcorder, developed as a successor to A1 Hi, offers the novel digital special-effect imaging function, stereophonic recording level adjust mechanism and other advanced features while inheriting A1 Hi's high picture quality, functional versatility, ease of use and reputed styling.

1-1 Main features

1) Superative picture and sound qualities

- ° Hi8 video recording
- ° High-resolution CCD with 470,000 pixels
- ° High-performance 10x power zoom lens
- ° Dynamic aperture circuit
- ° Hi-Fi FM stereo recording
  (Recording level adjust mechanism, stereo recording level meter mounted)

2) Functional versatility

- ° Digital functions (for overlap, freeze, art freeze, closeup, slow shutter)
- ° Piezo AF system for imaging in high-magnification zooming
- ° Hibrid AWB auto white balance control mechanism
  (The sensor AWB function and TTL AWB function are microcomputer-controlled.)
- ° Digital manual iris function with AE lock
- ° High speed shutter (1/10000, 1/4000, 1/2000, 1/1000, 1/500, 1/250, 1/120 sec.)
- ° Auto-tracking back light compensation
- ° Auto-tracking focusing
- ° Recording search
- ° AF macro lens
- ° Three-mode timer recording (self-timer, interval-timer, program-timer)
- ° Special-effect playback functions (field still playback, frame advance playback, slow playback)
- ° Noise-free fine still, frame advance and slow playback with the double-azimuth three-head rotating drum.

3) Ease of use

- ° Dual action grip
- ° Accelerating/decelerating power zooming
- ° Diagonal installation of recorder section
- ° 180° rotatable electronic viewfinder
- ° Linear time counter
- ° Wireless controller WL-100
- ° Sports finder SF-200

1-2 Comparison with the A1 Hi

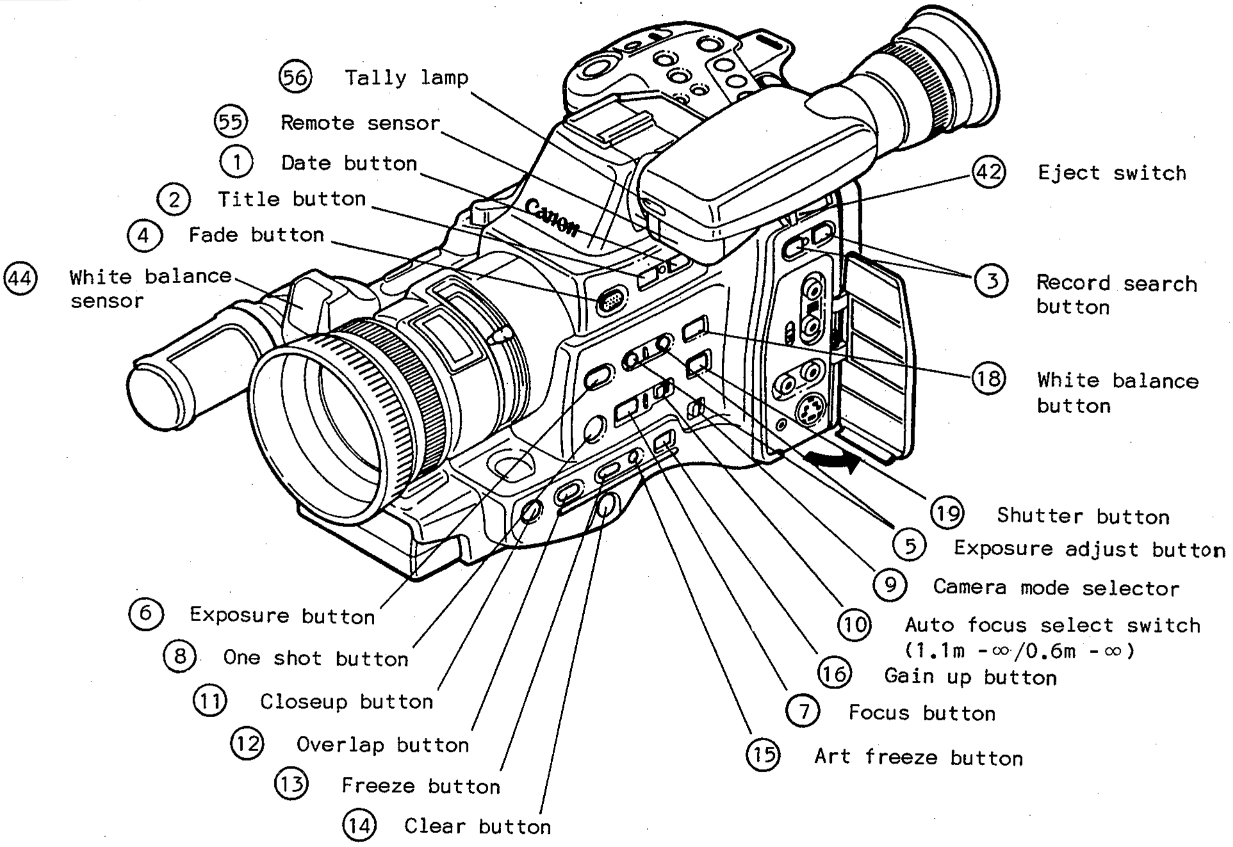
Camera section

Function	A2 Hi	A1 Hi
CCD	Interline Total : 470,000 pixels Effective: 440,000 pixels	Semi-frame itnerline Total : 420,000 pixels Effective: 400,000 pixels
High speed shutter	1/10000, 1/4000, 1/2000, 1/1000, 1/500, 1/250, 1/120	1/2000, 1/1000, 1/500, 1/250
Slow/shutter	1/25, 1/12, 1/8, 1/6	Not provided
Color signal processing	RGB processing	Color differential signal processing
Exposure compensation	AE lock, Digital manual iris, Auto-tracking back light compensation	AE lock, Digital manual iris
AF system (Nearest distance focusable)	Edge-spread piazo AF system (0.6 m macro AF)	Piezo AF system (1.1 m)
AWB measuring sensor (TTL AWB correction aces)	Absorbed into IC (R-B, MG-2G)	Photodiode (R-Y, B-Y)
Stereo mix sound direction angle	90°	150°

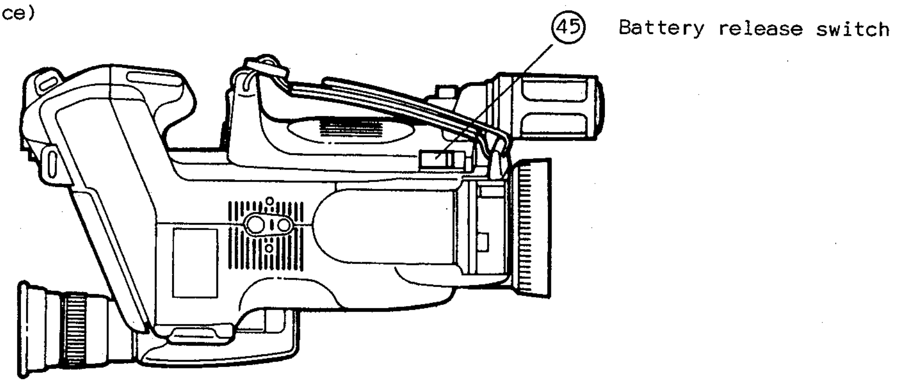
Recorder section

Function	A2 Hi	A1 Hi
Digital recording functions (closeup, overlap, freeze, art freeze, slow shutter)	Provided	Not provided
High speed search	SP-mode 15 times higher in forward/backward search LP-mode 30 times higher in forward/backward search	Fast-forward playback 9 times Reverse playback 7 times
Dynamic aperture correction function	Provided	Not provided
Audio signal	Headphone terminal output level adjustable	Not provided

1-3 Nomenclature

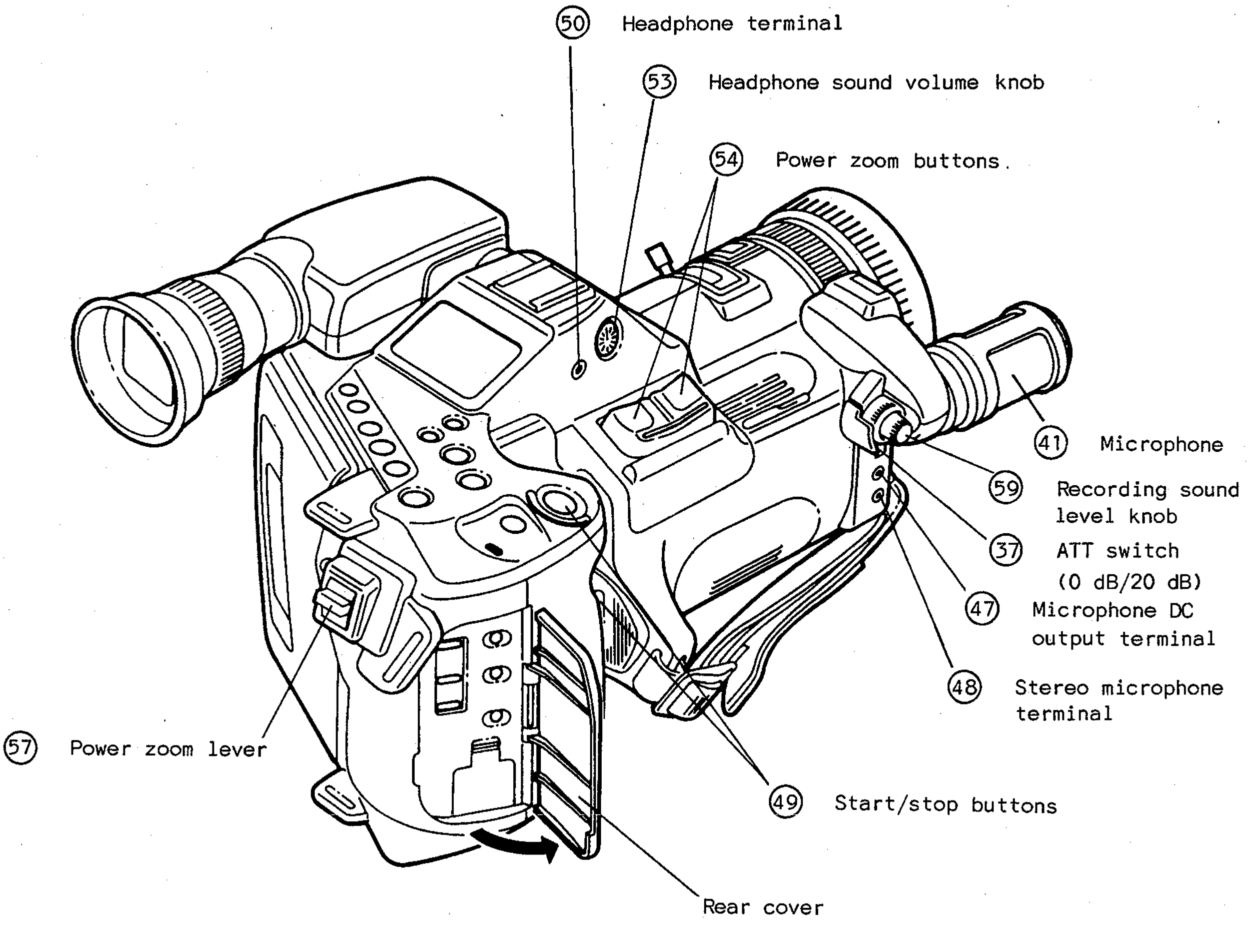

(56) Tally lamp
(55) Remote sensor
① Date button
② Title button
④ Fade button
㊹ White balance sensor
㊷ Eject switch
③ Record search button
⑱ White balance button
⑲ Shutter button
⑤ Exposure adjust button
⑨ Camera mode selector
⑩ Auto focus select switch (1.1m -∞/0.6m -∞)
⑯ Gain up button
⑦ Focus button
⑮ Art freeze button
⑥ Exposure button
⑧ One shot button
⑪ Closeup button
⑫ Overlap button
⑬ Freeze button
⑭ Clear button

(Bottom face)

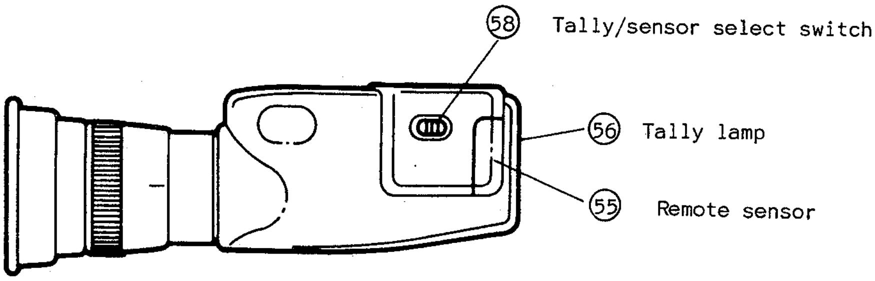

㊺ Battery release switch

① Touche de datation DATE
② Touche de titrage TITRE
③ Touches de recherche d'enregistrement (REC SEARCH)
④ Touche de fondu FONDU
⑤ Touches de réglage d'exposition CORRECTION +/−
⑥ Sélecteur de mise au point FOCUS
⑦ Levier de changement de focale
⑧ Sélecteur d'exposition EXPO A/M
⑨ Touche de sélection de mode MODE CAMERA
⑩ Sélecteur de plage de mise au point Autofocus (1,1 m~∞/0,6 m~∞)
⑪ Touche de doubleur DOUBLEUR
⑫ Touche de fondu enchaîné F. ENCHAINE
⑬ Touche arrêt d'image IMAGE MEMO
⑭ Touche d'effacement MISE A 0
⑮ Touche image graphique IMAGE GRAPHIC
⑯ Touche de stroboscopie IMAGE STROBO
⑱ Sélecteur de balance des blancs mémorisée BAB A/M
⑲ Touche de vitesse obturateur VITESSE
㊷ Touche d'éjection EJECT
㊺ Commutateur d'éjection de batterie BATT EJECT
(55) Capteur de signal de télécommande
(56) Voyant "tournage"

Fig. I-1


㊿ Headphone terminal
(53) Headphone sound volume knob
(54) Power zoom buttons.
㊶ Microphone
(59) Recording sound level knob
㊲ ATT switch (0 dB/20 dB)
㊼ Microphone DC output terminal
㊽ Stereo microphone terminal
(57) Power zoom lever
㊾ Start/stop buttons
Rear cover

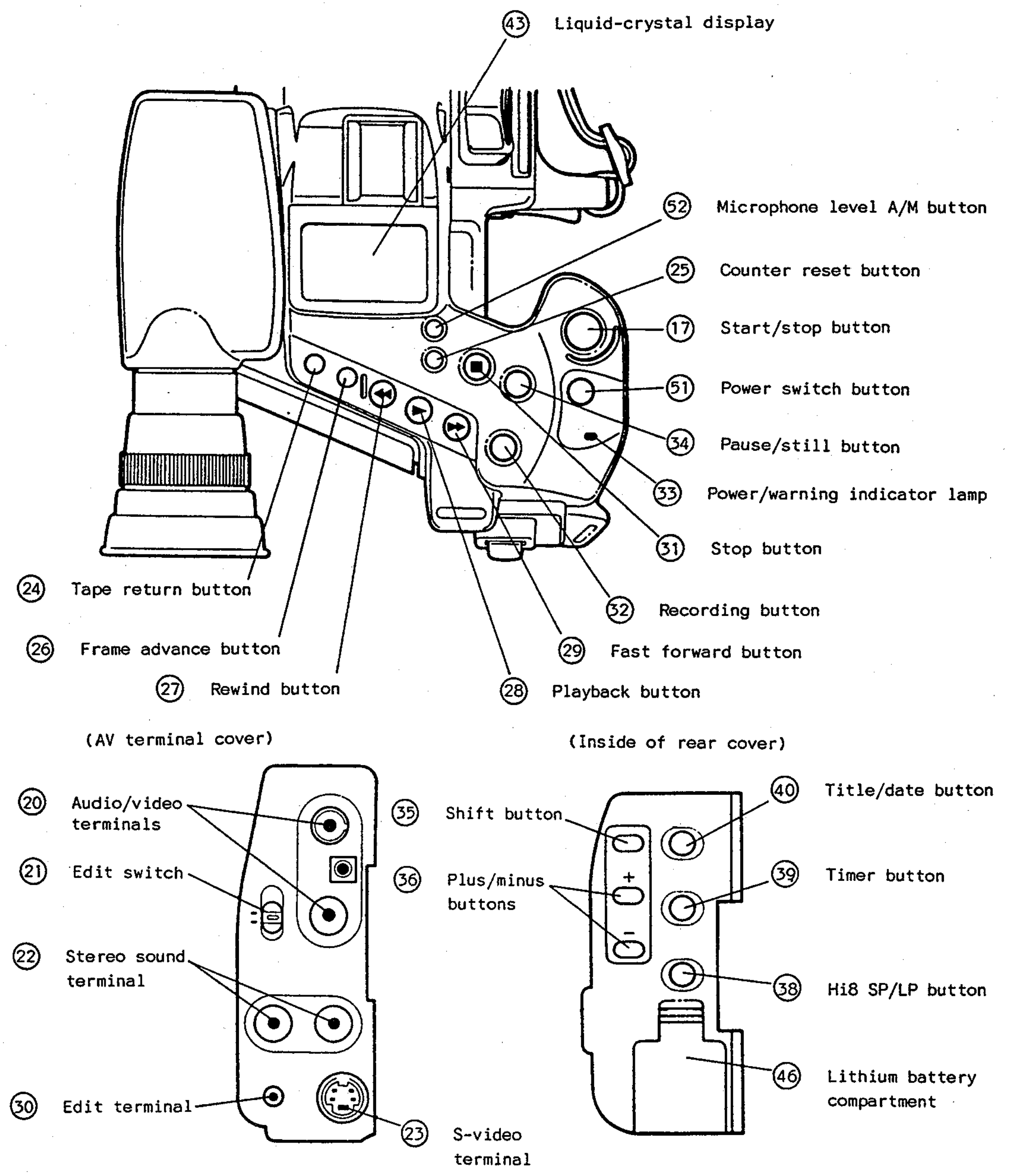
(View finder)


(58) Tally/sensor select switch
(56) Tally lamp
(55) Remote sensor

㊲ Commutateur ATT (0 dB/20 dB)
㊶ Microphone stéréo
㊼ Prise de courant continu DC OUT
㊽ Prise de microphone stéréo MIC
㊾ Déclencheur
㊿ Prise écouteurs ECOUTEUR
(53) Commande de niveau d'écouteurs

(54) Zoom motorisé
(55) Capteur de signal de télécommande
(56) Voyant "tournage"
(57) Zoom motorisé
(58) Commutateur tournage/détecteur
(59) Commandes de niveau d'enregistrement REC LEVEL

Fig. I-2


㊸ Liquid-crystal display
(52) Microphone level A/M button
㉕ Counter reset button
⑰ Start/stop button
(51) Power switch button
㉞ Pause/still button
㉝ Power/warning indicator lamp
㉛ Stop button
㉔ Tape return button
㉜ Recording button
㉖ Frame advance button
㉙ Fast forward button
㉗ Rewind button
㉘ Playback button
(AV terminal cover)
(Inside of rear cover)
⑳ Audio/video terminals
㉟ Shift button
㊵ Title/date button
㉑ Edit switch
㊱ Plus/minus buttons
+
−
㊴ Timer button
㉒ Stereo sound terminal
㊳ Hi8 SP/LP button
㊻ Lithium battery compartment
㉚ Edit terminal
㉓ S-video terminal

⑰ Déclencheur

⑳ Prises de sortie audio/vidéo

㉑ Commutateur de montage MONTAGE
Normalement, le régler sur NON

㉒ Prises de sortie stéréo SORTIE AUDIO

㉓ Prise de sortie Hi8

㉔ Touche de retour de bande MEMOIRE

㉕ Touche de remise à zéro de compteur MISE A ZERO

㉖ Touche d'avance image par image I/I

㉗ Touche de rembobinage RETOUR

㉘ Touche de lecture LECTURE

㉙ Touche d'avance rapide AVANCE

㉚ Prise de commande à distance MONT

㉛ Touche d'arrêt STOP

㉜ Touche d'enregistrement ENR

㉝ Voyant d'alimentation et d'avertissement MARCHE/CONTROLE

㉞ Touche de pause/arrêt sur image PAUSE/ARRET I.

㉟ Touche de déplacement du curseur SHIFT

㊱ Touche +/−

㊳ Touche Hi8-SP/LP

㊴ Touche de minuterie RETARD/INTERV

㊵ Touche de titrage/datation TITRE/DATE

㊸ Affichage à cristaux liquides

㊻ Logement de pile au lithium

(51) Touche de fonctionnement

(52) Niveau de microphone NIVEAU SON A/M

Fig. I-3

1-4 Brief description of control buttons, terminals and external parts

① Date button (DATE)
Pressing this button in the camera mode presents the current date/time on the viewfinder screen. In the camera recording, the date/time can be imposed on pictures.

Date/time not displayed (At power-on)	⇨	1. OCT. '90 (Only date displayed)	⇨	Date/time not displayed	⇨	AM12:34 (Only time displayed)	⇨	Date/time not displayed	⇨	AM12:34 1. OCT. '90 (Date and time displayed)

② Title button (TITLE)
Pressing this button in the camera mode presents the memorized title on the viewfinder screen. In the camera recording, the user-created title can be imposed on pictures. (Maximum: 32 letters)

③ Record search button (REC SEARCH)
In the camera recording pause state, while the recording search button (+)/(-) is being held down, the tape is fed/rewound to reproduce the recorded images in forward/backward direction. Thus, the user can locate the cue position of tape without changing over to the playback mode. When the minus button (-) is pressed once, the previous recording for approx. three seconds is played back to allow the user to check it. Then, the tape is returned to the pause-requested position and the machine is set to the recording pause state.

④ Fade button (FADE)
When this button is pressed and held on, the image and sound disappear gradually (fading-out). When this button is released, they appear gradually (fading-in). The white fading function is employed, and it is not interlinked with the trigger button.

⑤ Exposure adjust button (ADJ)
In the camera manual mode, the user can manually adjust exposure level. The aperture (iris) opens/closes gradually while the plus/minus button (+)/(-) is pressed in the manual exposure state. When it is released, the iris is locked and the manually adjusted exposure level is indicated on the viewfinder screen.

⑥ Exposure button (EXPOSURE)
In the camera manual mode, each press of this button toggles between the auto iris state and the manual iris state. When the manual iris operation is selected, the exposure level is indicated on the viewfinder screen. This indication is not reset by turning on/off the power switch.

⑦ Focus button (FOCUS)
In the camera manual mode, each press of this button toggles between the auto focus state and the manual focus state. When the auto focus state is selected, the zone is displayed on the viewfinder screen.

⑧ One shot button
In the manual focus mode, only while this button is held down, the auto focus function is made active with range setting of '1.1 m to infinity' or '0.6 m to infinity' established by the auto focus select switch ⑩.

⑨ Camera mode selector (CAMERA MODE)
In the camera mode, when the A (auto) position is selected, such control functions as white balance, focus adjustment, high-speed shutter and exposure functions are put in fully automatic state. When the M (manual) position is selected, these control functions are adjusted according to the user settings to allow shooting at his or her discretion. The user settings are retained in memory even if the mode is switched to A (auto). (This setting revives when the manual mode is set again). Note, however, that the user settings are reset when the power supply is removed and the auto mode is assumed when it is attached again.

⑩ Auto focus select switch
In AF macro zooming, select '0.6 m to infinity' range setting. In normal videographing, select '1.1 m to infinity' range setting.

⑪ Closeup button (CLOSE-UP)
Used to electronically enlarge the center area image on screen two times in the camera mode. With the zoom lever set to the telephoto end position, the center area image on screen can be videographed at a magnification of 20 times.

⑫ Overlap button (OVERLAP)

° Overlap
Pressing this button in the recording pause or recording state causes 'OVERLAP' to apepar on the viewfinder screen. When the recording state is changed over to the recording pause state by pressing the start/stop button, the camera EE image taken at that moment is stored into the internal memory. Then, when the start/stop button is pressed again, the overlap sequence is carried out. In the overlap sequence, the EE image is changed to the memorized image and then it gradually returns to the EE image.

° Overlap memory check
Pressing this button in the recording pause mode causes the memorized image to be output. While this button is held down, the memorized image is output. When it is released, the overlap function is activated to cause gradual changeover to the EE image.

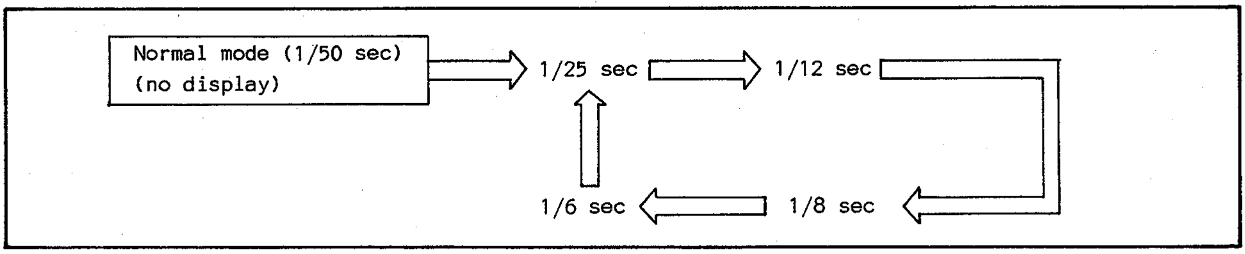
° Overlap rehearsal mode
Pressing this button in the stop state sets up the rehearsal mode in which the EE image taken at present is stored into the internal memory. While this button is held down, the memorized image is output. When it is released, the overlap function is activated to cause gradual changeover to the EE image.

⑬ Freeze button (FREEZE)
Pressing this button causes 'FREEZE' to appear on the viewfinder screen. In this mode, the EE image is stored as a still picture into the internal memory and it is output intact.
In normal recording, the sound is also recorded.
When this button is held down for one second or more, the stroboscopic effect can be produced (equivalent to pressing the button 7.5 times per second). In combinational use with the interval timer, a new freeze-frame image is taken with each press of this button. Thus, complete still pictures can be recorded at a predetermined interval.

⑭ Clear button (CLEAR)
Used to clear the digital functions for closeup, overlap, freeze, art freeze and slow shutter.

⑮ Art freeze button (ART FREEZE)
Pressing this button causes 'ART FREEZE' to appear on the viewfinder screen. With this function (equivalent to freeze-frame function), a pictorial art still image can be obtained.

⑯ Gain up button (SLOW SHUTTER)
Pressing this button in the camera manual mode changes the shutter speed in a cyclic manner as follows; 1/25 - 1/12 - 1/8 - 1/6. The currently selected shutter speed is indicated on the viewfinder screen.

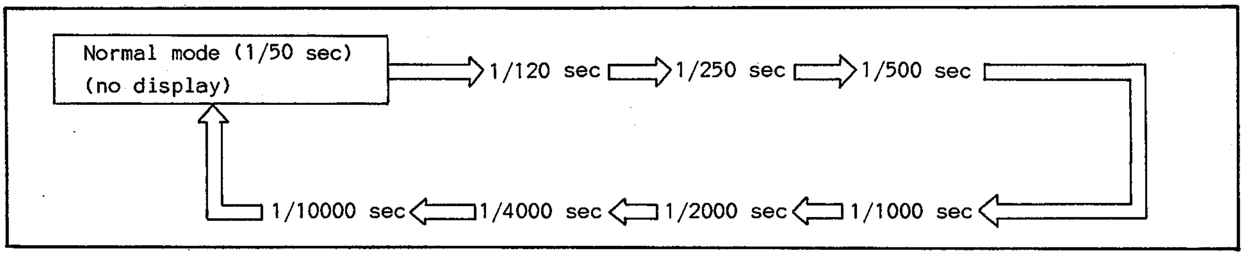


Note: When the high speed shutter is selected, the slow shutter function is disabled and the AF rangefinding frame does not appear on the viewfinder screen.

⑰ Start/stop button
Pressing this button in the recording pause state starts recording. Then, pressing it again sets up the recording pause state again.
This button is also used for starting/canceling the self/interval timer function.

⑱ White balance button (WHITE BALANCE)
In the camera manual mode, each press of this button toggles between the full auto white balance state and the white balance setup state. When the white balance setup state is selected, the message "WB SET" is displayed on the viewfinder.

⑲ Shutter button (SHUTTER)
In the camera mode, each press of this button changes the shutter speed to 1/120, 1/250, 1/500, 1/1000, 1/2000, 1/4000 and 1/10000 sec (then to the normal speed) in a cyclic fashion as indicated below. The selected shutter speed is displayed on the viewfinder screen.



⑳ Audio/video terminals
Output terminals for audio/video signals. The RF unit is availabel where this machine is connected with the television receiver not equipped with the audio/video input terminal.

㉑ Edit switch
Used for editing of the recorded tape. Turn on this switch only when editing the tape with this machine connected for playback. Deterioration of the picture quality can be minimized by turning on this switch. In a common operation, turn it off.

㉒ Stereo sound output terminal
Used for outputting stereo sound.

㉓ S-video output terminal
Used for outputting the Y/C-separated S-video output signal.

㉔ Tape return button (TAPE RETURN)
Pressing this button in the stop mode rewinds the tape rapidly until the linear tape counter reaches (0:00:00) level. The linear tape counter is reset to (0:00:00) when the tape cassette is unloaded/loaded.

㉕ Counter reset button (COUNTER RESET)
In any mode, pressing this button causes the linear tape counter to be reset to (0:00:00).

㉖ Frame advance button (FRAME ADVANCE)
Pressing this button in the pause mode feeds the tape frame by frame. And, while it is held down, the slow-motion pictures are played back (1/5x slow motion).

㉗ Rewind button (REW/◀◀)
Pressing this button in the stop mode rewinds the tape. And, holding down this button in the playback mode reproduces the fast-motion pictures (7x fast motion). In the playback mode, releasing this button causes the machine to perform normal playback again. Also, if it is held down during tape rewinding, the pictures are reproduced backward rapidly (SP-mode in 15x fast motion, LP-mode in 30x fast motion) as the tape goes back.

㉘ Playback button (PLAY)
In other than the recording mode, pressing this button starts playback operation.

㉙ Fast forward button (FF/▶▶)
Pressing this button in the pause state causes the tape to be fed fast. If it is held down during playback, the pictures are reproduced forward rapidly (at a speed of 9x fast motion). When it is released, the machine resumes normal playback operation. Also, if this button is held down for fast-forward operation, the fast-forward playback operation is continued (SP-mode in 15x fast motion, LP-mode in 30x fast motion).

㉚ Edit terminal
With the VE-100 (separately available in near future) connected with this terminal, the assembly editing or other editing operations can be carried out with ease.

㉛ Stop button (STOP)
Pressing this button causes tape drive to stop.

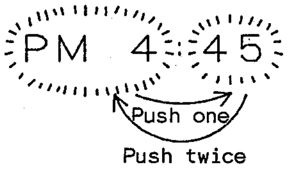
㉜ Recording button (RECORD)
When this button is pressed in the stop state or still playback mode, the machine is put in the recording pause mode.

㉝ Power/warning indicator lamp (POWER/ALARM)
When the machine condition is normal, this indicator lamp lights up by pressing the power switch. It blinks if any irregularity (e.g. low voltage of battery) takes place.

㉞ Pause/still button (PAUSE/STILL)
Pressing this button during playback causes the machine to go to the still playback mode. When this button is pressed in the still playback mode, the machine gets back to the normal playback mode. Also, pressing it during recording sets up the recording pause state. And, when it is pressed in the recording pause state, the machine resumes recording operation.

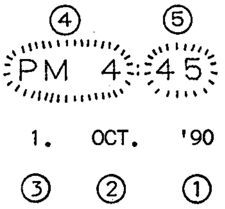
㉟ Shift button (SHIFT)

° Usable for setting the timer recording operation (up to 24 hours).
When this button is pressed after determining 'hours', the item is shifted to 'minutes'.



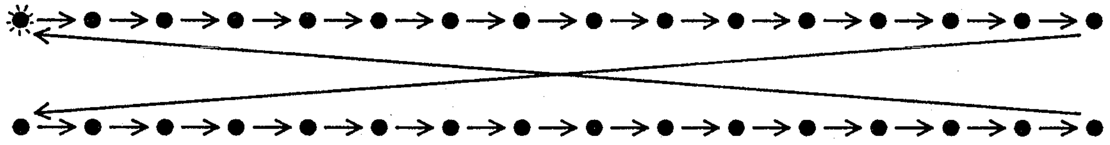
* Displayed both in EVF and crystal display screen.

° Used for setting the auto date function (year, month, day, hours, minutes). Each press of this button shifts the prompt from 'year' to 'month', 'day', 'hours' and 'minutes'.



⑥ all indication lights up. * Displayed in EVF.

° Usable to shifting the character position of title (16 characters on 2 lines).



㊱ Plus/minus button (+/-)

° Any start time can be set for the timer recording operation.

PM4 : 45
① ②

① AM1 <----> AM11 · PM12 · PM1 <----> PM11 · AM12

② 01 · 02 · 03 <--------------------> 58 · 59 · 00

° Any setting is allowed for the auto date function (year, month, day, hours, minutes).

PM4 : 45
④ ⑤
1. OCT. '90
③ ② ①

① '90, '91 <--------------> '09, '10

② JAN., FEB. <--------------> NOV., DEC.

③ 1, 2, 3, 4 <--------------> 29, 30, 31

④⑤ Same as in timer recording.

° Usable for selection of an alphanumeric character/special symbol in title.

° E type ␣ABCDEFGHIJKLMNOPQRSTUVWXYZÄÖÜØAÆÑÇÉ␣0123456789,./-'":;?!*&

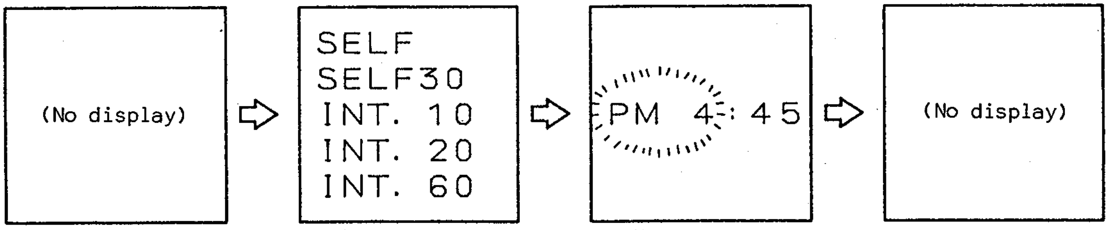
° F type ␣ABCDEFGHIJKLMNOPQRSTUVWXYZ␣0123456789,./-'":;?!*&Ç

By pressing the plus and minus buttons at the same time, 1) all the characters on the right can be deleted including the cursor, 2) a title cannot be created during the line input or recording. (The recording operation is not permitted when the line input is connected.) 3) Still frame picture/frame advance can be adjusted.

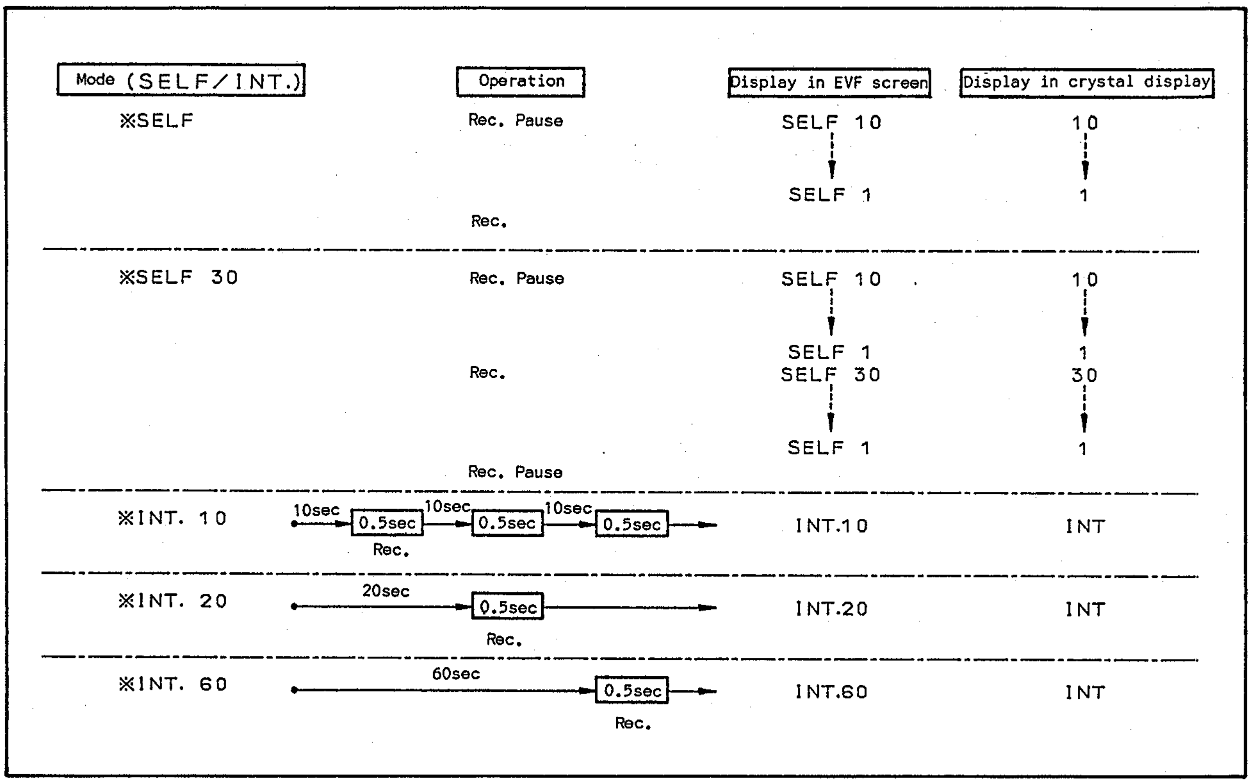
㊲ ATT switch (0 dB/20 dB)
In a situation where the sound is too loud, set this switch to 20 dB position to reduce the sound sensitivity. Thus, the sound can be recorded at a comfortable level.

㊳ Hi8 SP /LP button
Used to select the high-band SP/LP recording or the normal SP/LP recording. Changeover between 'Hi8 SP', 'Hi8 LP', 'SP' and 'LP' is possible only when the Hi8 tape is loaded. If this button is not pressed, the Hi8 SP recording will be automatically selected when Hi8 tape is being used, while normal SP or LP will be selected when normal 8 mm tape is being used. So this button should be pressed only for normal mode recording with Hi8 tape. Note that the normal 8 mm tape is not applicable to Hi8 format recording. EVF will appear on the liquid crystal display.

㊴ Timer button (TIMER)
When this button is pressed once in the recording pause state, the self-interval mode is selected. Then, to start the self-timer/interval operation, press the plus/minus button, select either 'SELF' or 'INTERVAL', and press the start/stop button.
The current time can be displayed by pressing this button twice. To adjust the timer indication, use the plus/minus button and the shift button. At the end of setting, press the start/stop button. This causes the machine power to turn off. The user can thus make timer recording reservation. (In this case, "🕘" mark is presented only on the liquid-crystal display.)



(Push once) (Push twice) (Push three times ... returned first state)



Mode (SELF/INT.)	Operation	Display in EVF screen	Display in crystal display
※SELF	Rec. Pause Rec.	SELF 10 ↓ SELF 1	10 ↓ 1
※SELF 30	Rec. Pause Rec. Rec. Pause	SELF 10 ↓ SELF 1 SELF 30 ↓ SELF 1	10 ↓ 1 30 ↓ 1
※INT. 10	10sec → 0.5sec → 10sec → 0.5sec → 10sec → 0.5sec → Rec.	INT.10	INT
※INT. 20	20sec → 0.5sec → Rec.	INT.20	INT
※INT. 60	60sec → 0.5sec → Rec.	INT.60	INT

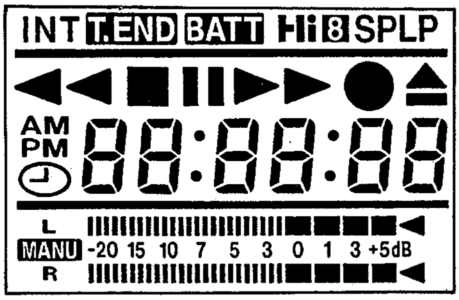
For cancellation, press the stop button, the start/stop button and the plus/minus button in the self/interval mode. Thus, the user can select any mode.

㊵ Title/date button (TITLE/DATE)
When this button is pressed once, the title mode is set up. To create a title, use the shift and plus/minus buttons. On completion of a title, press the title/date button again. This causes the blinking of title to cease. By this step, the created title is stored into memory.
To insert the title in recording, press the title button. If it is not desired to make the title disappear, press it again. (The user can check the title on the viewfinder screen.)

㊶ Microphone
Stereo directional microphone.

㊷ Eject switch (EJECT)
In other than the recording mode, pressing this switch to eject the cassette tape.

㊸ Liquid-crystal display
This display can provides the indications shown below. The linear time counter has a range of up to ±9:59:59.



㊹ White balance sensor
Color temperature sensors (red, blue) with externally measuring system is equipped.

㊺ Battery release switch
When taking the power supply from the battery box, slid this switch forward.

㊻ Lithium battery compartment
Contains the lithium battery for auto date function. The lithium battery has a service life of approx. one year.

㊼ Microphone DC output terminal
Used to provide power output for the optional stereo microphone.

㊽ Stereo microphone terminal
Used as power supply output terminal of the optional stereo microphone.

㊾ Start/stop button
Pressing this button in the recording pause state cause the machine to resume recording.
When this button is pressed again, the recording pause state is set up again.
This button is also usable to start/cancel the self/interval timer function.

㊿ Headphone terminal
Used for headphone output.

(51) Power switch button
Used to turn power on/off.

(52) Microphone level A/M button
Used for auto/manual adjustment of the recording level of microphone sound. With the manual adjustment selected, the left/right channel level can be controlled using the recording level know ㉘. Thus, the sound can be recorded with its level changed.

(53) Headphone sound volume knob
The sound volume of headphone can be adjusted with a commercially available stereo headphone connected to HEADPHONES terminal.

(54) Power zoom button
The frame (angle of view) can be changed from 'wide angle view' to 'telephoto view' continuously.

(55) Remote sensor
The remote control signal is received through this window.
Light receiving angle : Approx. 30° at left/right
Approx. 15° at upper/lower
Remote-controllable distance: 5 meters

(56) Tally lamp
This lamp flashes during the recording operation or self/interval timer operation. Also, it ligths up when the remote control signal is received.

Recording	Flashes at 1 Hz cycle
Self-timer standby state	On : 0.5 sec. Off: 1.5 sec.
Interval timer	On : 0.5 sec. Off: 1.5 sec.
Remote control signal	Lights up steady.

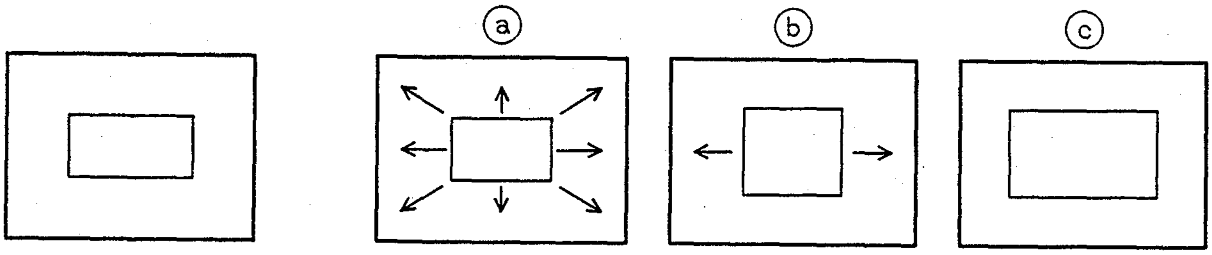
(57) Power zoom lever
The frame (angle of view) can be changed from 'wide angle view' to 'telephoto view' continuously.

(58) Tally/sensor select switch
In normal opeation, turn this switch on. When it is turned off, the tally lamp goes out to prevent a reflected image of tally lamp in videographing through glass or macro zooming.

(59) Recording sound level knob
In the manual adjustment of microphone sound level, the left/right channel level can be adjusted for recording with this know.

≪AF rangefinding frame (zone)≫

AF range finding and tracing frame (zone) indication



*: AF range finding frame is fixed as above.
AF tracing frame varies according to the depth degree of subject.
ⓐ Moves horizontally, diagonally and vertically. ⓑ: Moves horizontally. ⓒ: Fixed.

1-5 Information display on electronic viewfinder

The electronic viewfinder in Model A2 Hi lets the user readily know a repertoire of current statuses and data. It displays the camera operating status, recorder operating mode, warning message, AF rangefinding zone, etc. Still more, the user can select the normal display mode (auto date/title display) or the timer setting menu mode at a touch of the button.

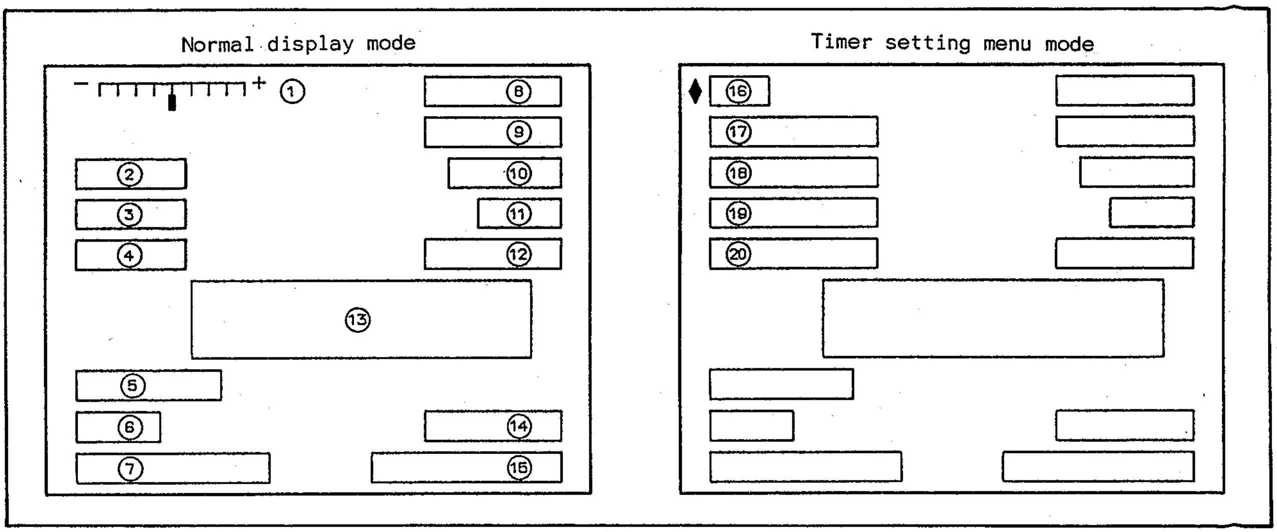


Fig. I-4

[- - -] : F model

① Iris indication

② White balance indication

* WB SET	BAL. MAN.

Blinks during adjustment or when adjustment is disabled.

③ Electronic shutter speed indication

- 1/120
- 1/250
- 1/500
- 1/1000
- 1/2000
- 1/4000
- 1/10000

④ Timer mode indication

SELF 10	RETARD 10
SELF 30	RETARD 30
INT. 10	
INT. 20	
INT. 60	

The self timer is of a down-counting type.

Program timer
Time setting

- AM12:00

⑤ Digital function

CLOSE-UP	DOUBLEUR
OVERLAP	FOUND ENCH.
FREEZE	ARR/IMAGE
ART FREEZE	ARR/SPECIAL

Slow shutter

- 1/25
- 1/12
- 1/8
- 1/6

⑥ Hi8 mode indication

- Hi8 SP
- Hi8 LP
- SP
- LP

⑦ Camcorder mode indication

REWIND	RETOUR
FF	AVANCE
PLAY	LECTURE
STILL	ARRET/I-I
REC PAUSE	PAUSE ENR
REC	ENR
STOP	
* EJECT	

*: Blinks on occurrence of an error.

⑧ Counter indication

- 1:23:00

Hours:Minutes:Seconds

⑨ Tape-unloading/ end indication

* CASSETTE	
TAPE END	BAND FINIE

*: Blinks for warning.

⑩ Low-battery-voltage warning indication

* BATTERY	BATTERIE

*: Blinks.

⑪ Dew condensation warning indication

* DEW	CONDENSATION

*: Blinks.

⑫ Low-lithium-voltage warning indication

* DATE BATT	BATT DATEUR

*: Blinks.

⑬ Title indication

16 characters

16 characters

The displayable characters are as follows:

A2 HiE

␣ABCDEFGHIJKLMNOPQRSTUVWXYZ
ÄÖUØÅÆÑÇÊ␣0123456789,./-'":
:?!*&

A2 HiF

␣ABCDEFGHIJKLMNOPQRSTUVWXYZ
␣0123456789,./-'":;?!*&Ç

⑭ Time indication

PM 4:45

Hours:Mintues

⑮ Date indication

1. OCT. '90

Day, Month, Year (1. JAN. 1990 to 31. DEC. 2010)

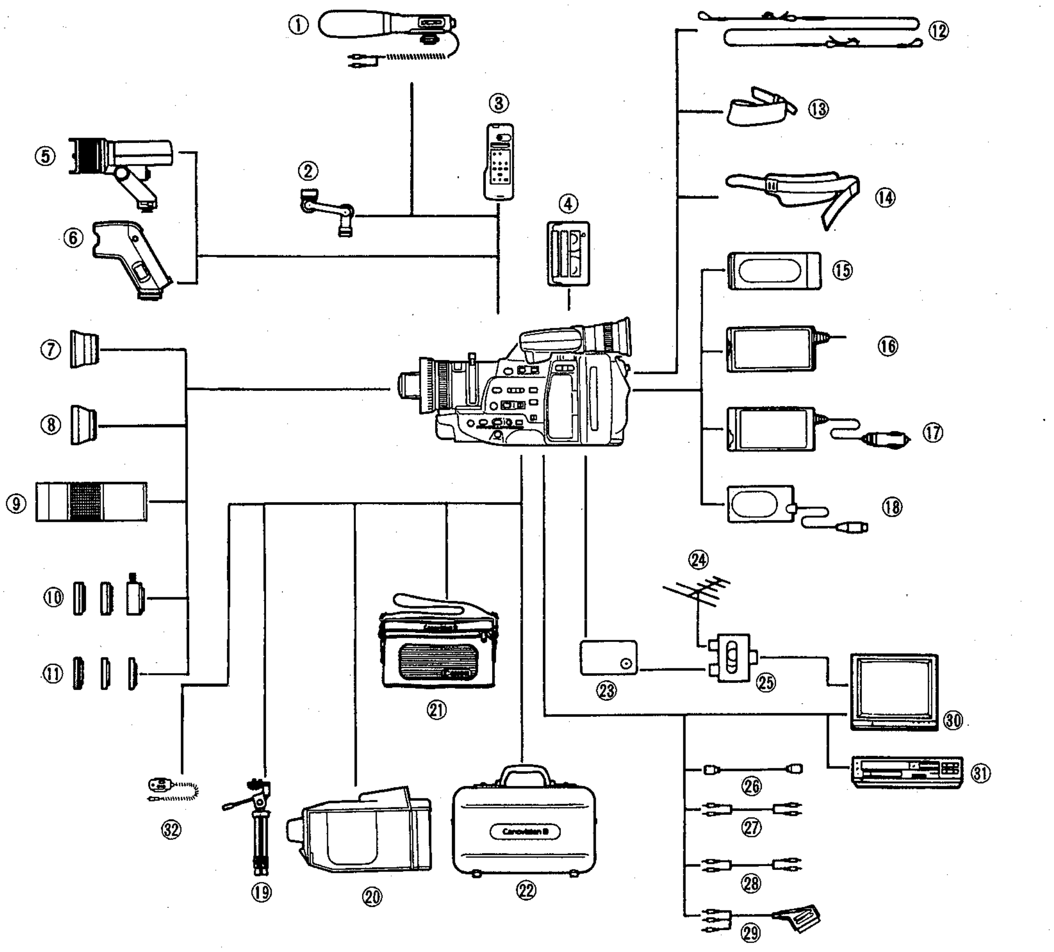
Timer setting menu (Select a menu item by moving ◆ mark.)

⑯ SELF　RETARD
⑰ SELF 30　RETARD 30
⑱ INT. 10
⑲ INT. 20
⑳ INT. 60

When the mode selected through the menu is set up, the timer mode indication ④ appears on the viewfinder screen. If 'SELF' is selected, its indication is counted down as soon as the self-timer is started. When the timer recording operation is selected, its time indication (⑭) appears on the viewfinder screen.

1-6 A2 HiE system chart

Canovision A2Hi Video System Chart

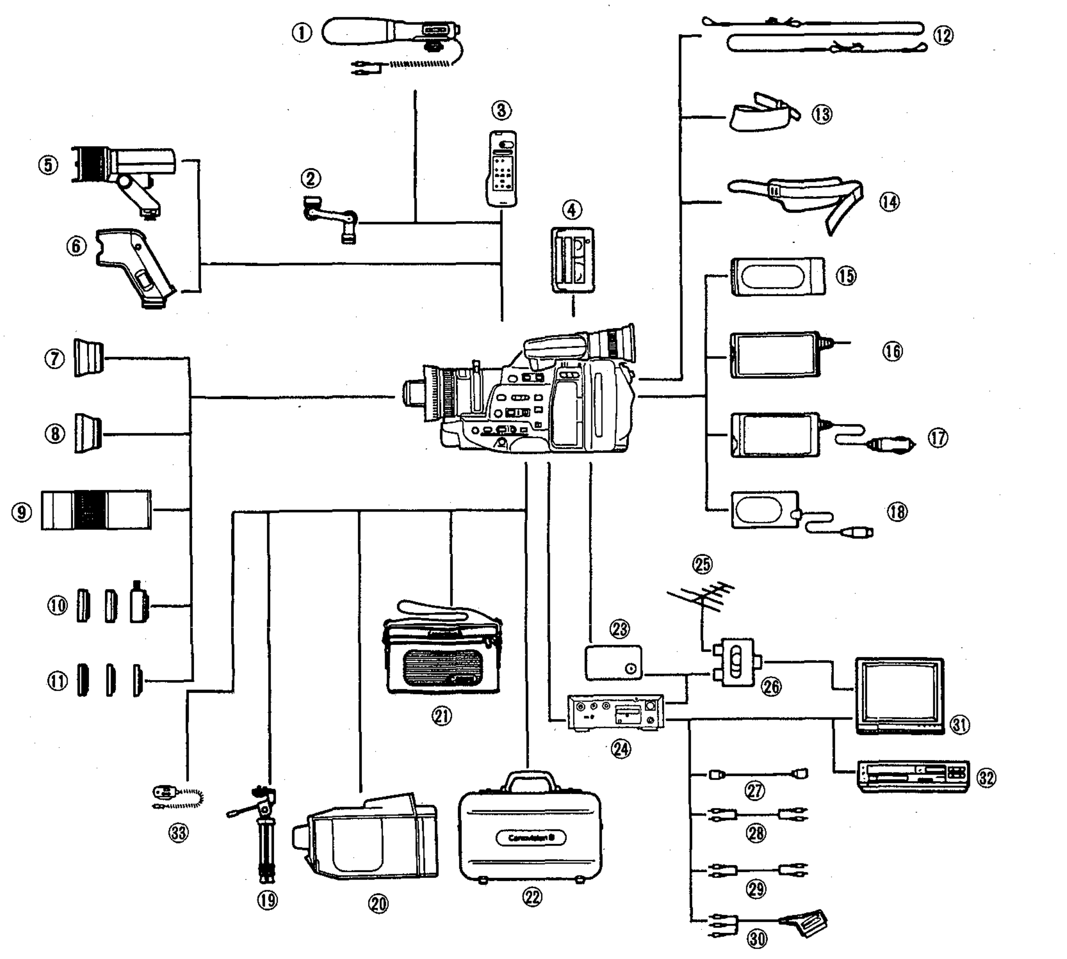


① MM-200 Stereo Mixing Microphone
② MB-100 Microphone Boom
③ WL-100 Wireless Controller
④ 8mm Video Cassette
⑤ VL-30 Battery Video Light
⑥ VL-20 Battery Video Light
⑦ WD-55 Wide Converter
⑧ TL-55 Tele-converter
⑨ TL-55L3X Tele-converter
⑩ FS-55 Filter Set
⑪ FS-55U Filter Set
⑫ SS-200 Shoulder Strap
⑬ WS-20 Wrist Strap
⑭ GB-100 Grip Belt
⑮ BP-E718 Battery Pack
⑯ CA-E7 Compact Power Adapter
⑰ CB-E7 Car Battery Adapter
⑱ CR-E7K Charge Coupler
⑲ Tripod
⑳ RS-A2 Rain Shield (Available soon)
㉑ SC-E708 Soft Carrying Case
㉒ HC-A2 System Case
㉓ RU-E3 RF Unit
㉔ Aerial
㉕ Antenna Selector
㉖ S-150 S-video Cable
㉗ ST-150 Stereo Cable
㉘ C-150 AV Cable
㉙ PC-270SST/PC-170ST Stereo SCART Cable
㉚ TV
㉛ VTR
㉜ ZR-100 Zoom Remote Controller

Fig. I-5-1

1-7 A2 HiF system chart

Système vidéo Canon A2Hi



① Microphone de mixage stéréo MM-200
② Bras articulé MB-100 pour microphone
③ Télécommande infrarouge WL-100
④ Vidéocassette 8mm
⑤ Torche vidéo à batterie d'alimentation VL-30
⑥ Torche vidéo à batterie d'alimentation VL-20
⑦ Convertisseur grand-angle WD-55
⑧ Convertisseur télé TL-55
⑨ Convertisseur télé TL-55L3X
⑩ Jeu de filtres FS-55
⑪ Jeu de filtres FS-55U
⑫ Bandoulière SS-200
⑬ Dragonne WS-20
⑭ Sangle de poignée GB-100
⑮ Batterie d'alimentation BP-E718
⑯ Adaptateur secteur compact CA-E7
⑰ Adaptateur pour batterie de voiture CB-E7
⑱ Coupleur de charge CR-E7K
⑲ Trépied
⑳ Protection anti-pluie RS-A2
㉑ Etui de transport souple SC-E708
㉒ Valise système HC-A2
㉓ Unité HF RU-E3
㉔ Transcodeur TC-E21
㉕ Antenne VHF
㉖ Sélecteur d'antenne
㉗ Câble vidéo-S S-150
㉘ Câble stéréo ST-150
㉙ Câble AV C-150
㉚ Cordon péritélévision PC-270SST/PC-170ST
㉛ Téléviseur
㉜ Magnétoscope
㉝ Télécommande de zoom ZR-100
(en vente prochainement)

Fig. I-5-2

2. New Technologies

2-1 Lens section

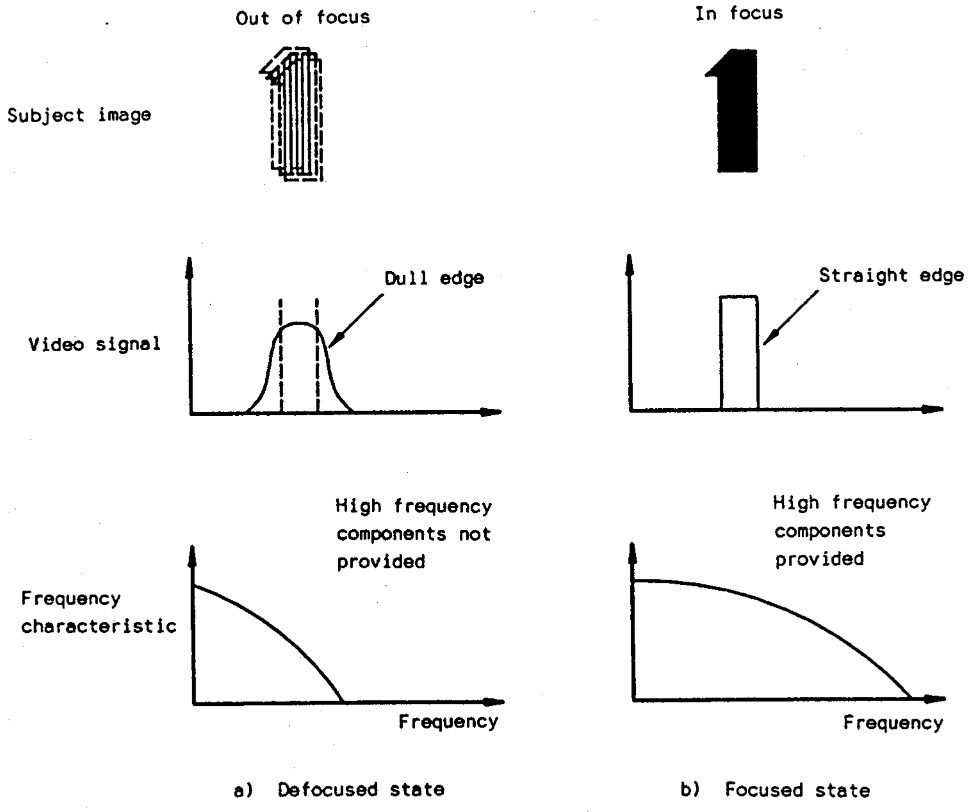
2-1-1 Edge spread (ES) plus piezoelectric auto-focusing

(1) Outline

In the piezoelectric auto-focusing adopted for the preceding Model A1, the CCD image sensor is oscillated by the piezoelectric element to detect level variations in video signal frequency components for judging whether front-, rear- or true-focusing is made. Also, based on the principle that the high frequency components of video signal increase as an image is brought closer to true focus, five band-pass filters are used to slow down the motor speed with increase of the high frequency components.

In contrast, the Model A2 Hi adopts 'edge spread plus piezoelectric auto-focusing' for its lensing operation. In this new auto-focusing approach developed by Canon, the motor speed is controlled based on the edge spread (ES) state of subject image while judgment of front-, rear- or true-focusing is conducted by the piezoelectric element in the same fashion as in the said preceding model.

Described briefly below is how this new auto-focusing system works: As an image of subject is brought closer to true focus, the high frequency components increase in the video signal and also the edge of subject image becomes clearer at the same time. Therefore, it is also possible to detect the focusing state by checking the sharpness of subject image edge. In the edge spread approach, the sharpness of subject image edge is determined to provide an ES value through the special ES filter. And, according to the iris opening data and focal length data, a lens defocus value is calculated to control the motor speed.


Out of focus
In focus
Subject image
Dull edge
Straight edge
Video signal
High frequency components not provided
High frequency components provided
Frequency characteristic
Frequency
Frequency

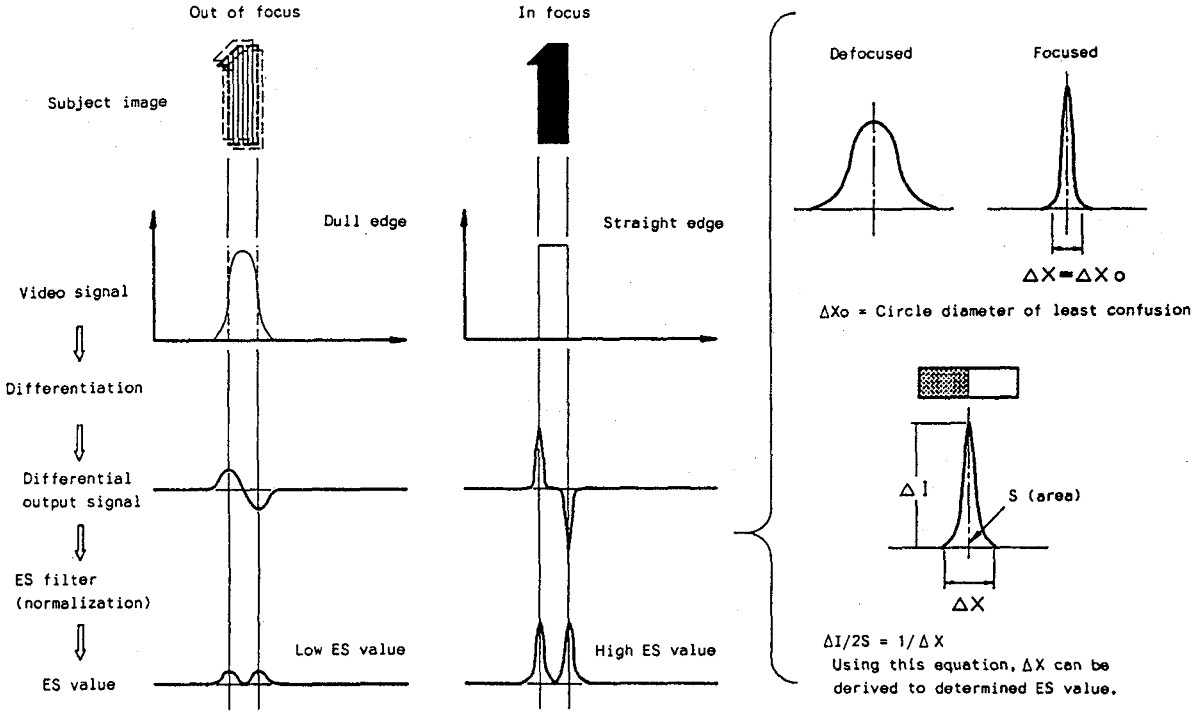
a) Defocused state b) Focused state

Fig. I-6

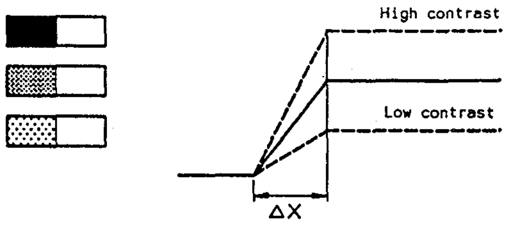
(2) Operating principle of ES filter

For detecting the sharpness of subject image edge, the video signal is differentiated first. When the subject image is out of focus, the differential output signal has a wide and low profile. When the subject image is in focus, its width becomes narrower and its height increases. The width (ΔX) of differential output signal is represented as an ES value. More specifically, in the defocus state, the edge of subject image is dull and the differential output signal is wide with gradual slopes. Therefore, an ES value corresponding to signal width is low. In the true-focus state, the edge of subject image is sharp and the differential output signal is narrowed to provide a sharp peak. As the signal width becomes narrower, the ES value is increased.

Note that the ES value output form the ES filter does not vary with the contrast and pattern of subject image. It represents only the degree of focusing. In principle, when the subject image is adjusted to true focus, the ES value remains intact regardless of whether the contrast is high or low.


Out of focus
In focus
Subject image
Dull edge
Straight edge
Video signal
Differentiation
Differential output signal
ES filter (normalization)
ES value
Low ES value
High ES value
Defocused
Focused
ΔX=ΔXo
ΔXo = Circle diameter of least confusion
ΔI
S (area)
ΔX
ΔI/2S = 1/ΔX
Using this equation, ΔX can be derived to determined ES value.

a) ES filter operation


High contrast
Low contrast
ΔX

b) ES value characteristic

Fig. I-7

(3) Operating principle of 'edge spread plus piezoelectric auto-focusing

In combination of the edge spread method, the piezoelectric auto-focusing is carried out in this product. The camera oscillating plate (piezoelectric element) is equipped on the CCD image sensor, and the sine-wave signal is applied to this plate to vibrate the CCD image sensor. Thereby, it can always be judged in which direction the focus lens is to be shifted. In Fig. I-8, a, b and c indicate displacements of the CCD image sensor due to oscillation of the piezoelectric element. And, a', b' and c' indicate level variations (modulation signal output) of ES value component caused by this oscillation.

The phases (see a', b', c') in the front focus state ① are opposite to those in the rear focus state ③, and the amplitudes are minimized (near zero) in the true focus state ②. Therefore, through checking the phase of modulation signal output, it is possible to determine the direction in which the focus lens is to be shifted. And, using the amplitude, it can be judged whether the subject image is in focus or not.

Also, the ES value increases as the subject image is brought closer to true focus. Therefore, the motor speed is slowed down according to the level variations.

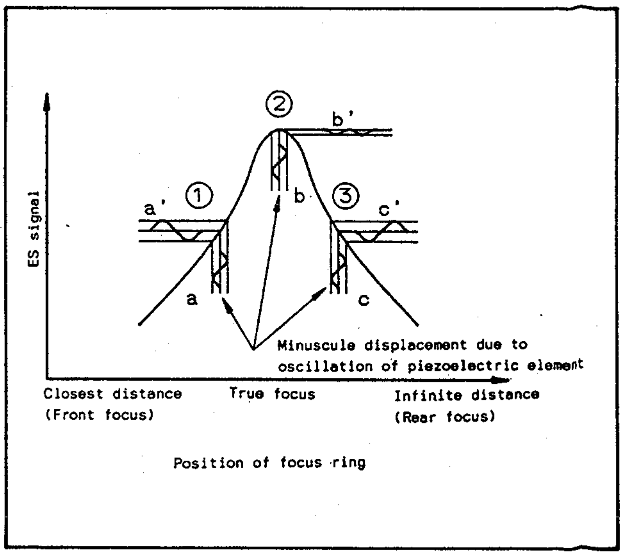


Fig. I-8

2-1-2 Auto-tracking focusing

(1) Basic operating principle

The area of approx. 90% in the effective screen is divided into 16 by 16 (256) cells. In each cell, the peak position of ES signal determined per V scanning (frame) is tracked. In actual operation, the peak position is tracked within the rangefinding frame allowed for auto-tracking auto-focusing (to be described in detail on the next page). In tracking, if the peak position is located per V scanning, the image of scene may change too rapidly and an unintended subject in scene may be tracked. To prevent this, the computational processing is performed as described below.

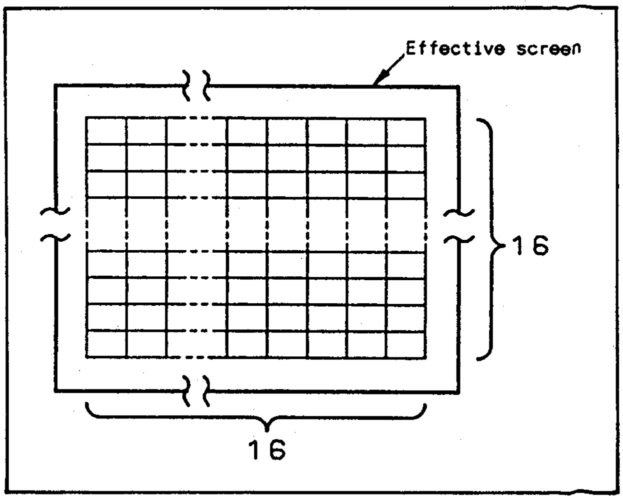


Fig. I-9

In the computational processing for auto-tracking operation, the peak coordinate positions in the last three scannings are memorized and the center of these positions is determined. Further, the centers thus attained in several fields are averaged. The resultant value is taken as the peak coordinate position in the relevant field, and the distance measuring range is moved around this position for auto-tracking. In this fashion, the rangefinding frame is moved smoothly.

(2) Rangefinding frame in auto-tracking auto-focusing

In the auto-tracking auto-focusing operation, the size and position of the rangefinding frame are automatically changed according to the depth of field of lens. The depth of field is detrmined by the focal length and 'f' stop value. In the model, the depth of field is divided into three levels for switchover of the rangefinding frame in auto-tracking auto-focusing as illustrated in Fig. I-11. Further, if the image becomes significantly out of focus at switchover to auto-tracking auto-focusing, the rangefinding frame is forced to shift to the center of screen.

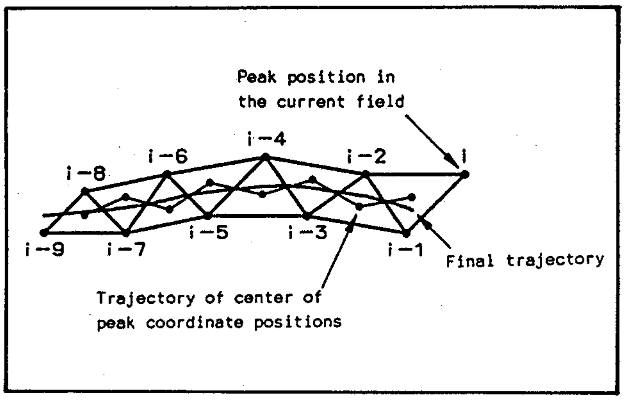

Peak position in the current field
i-4
i-6
i-2
i
i-8
i-9
i-7
i-5
i-3
i-1
Final trajectory
Trajectory of center of peak coordinate positions

Fig. I-10

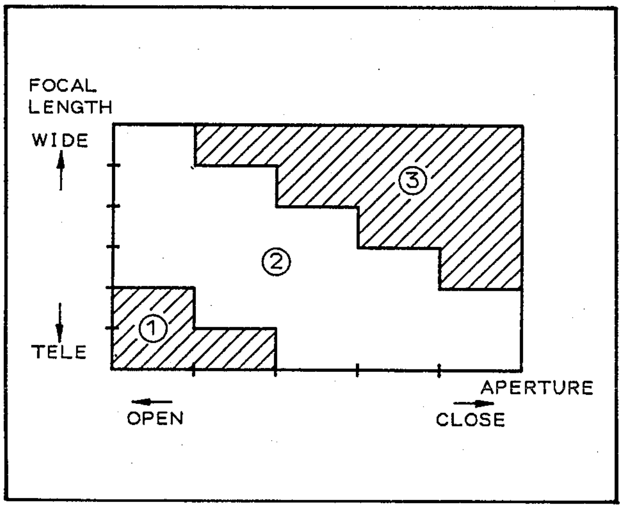
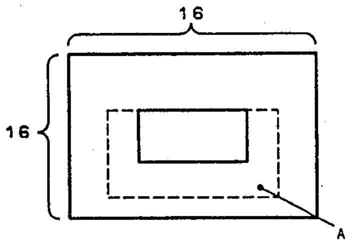
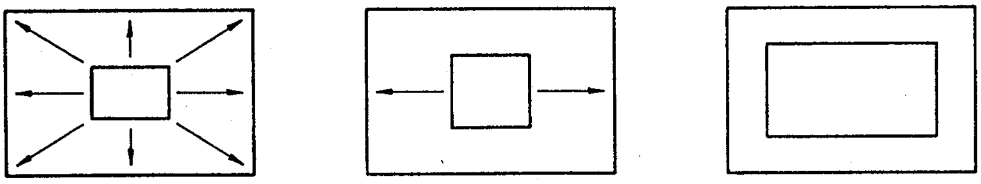


Fig. I-11



Scheme a) shows the rangefinding frame to be taken for normal auto-focusing operation. This frame is 5/16 cells high by 7/16 cells wide, and not movable. Note that the rangefinding frame switchover is not allowed in this mode as in the A1.

a) Normal auto-focusing:



b) **When the depth of field is short: (Fig. I-11①) The rangefinding frame is 5/16 cells high by 5/16 cells wide. It can move in any direction on the screen.**

c) When the depth of field is medium: (Fig. I-11②) This rangefinding frame is 7/16 cells high by 5/16 cells wide. It can move only in the horizontal direction.

d) When the depth of field is long: (Fig. I-11③) The nonmovable frame of 9/16 cells high by 9/16 cells wide is provided when the depth of field is long and the entire image on screen is in focus. In this case, the focus ring stops at a position of approx. 2.4 m.

Fig. I-12

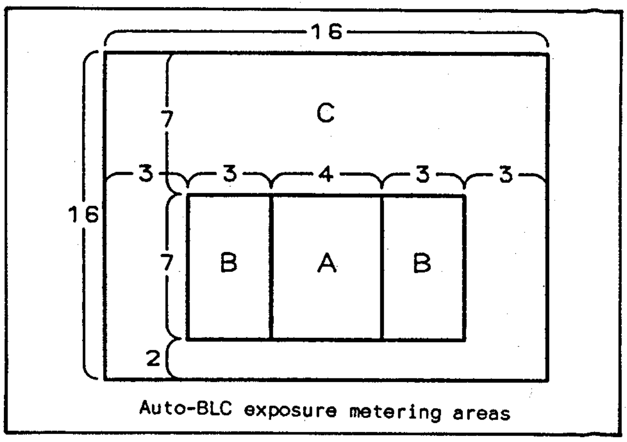
2-1-3 Auto-tracking auto-BLC

The auto-tracking auto-BLC function of this product allows the user to hold the BLC mode preset at center even if the main subject moves left or right.

Note that this auto-BLC function is workable only when the camera mode A (auto mode) is selected. It does not work when the camera mode M (manual mode) is selected. Therefore, when it is desired to make the auto-BLC function inactive, set the camera mode to M and the exposure mode to · A

(1) Back light detection and control operation

For auto-tracking auto-BLC, the screen is divided into 16 by 16 cells and the exposure metering areas are assigned in the ratio indicated in Fig. I-13. Using average luminance values (YA, YB and YC) on these exposure metering areas, it is judged whether the subject image is back-lighted or not as follows:



Auto-BLC exposure metering areas

Fig. I-13

(Judgment on back lighting)

1) When entering the BLC mode (both the expressions indicated below are satisfied):

- ° $(\overline{A+B} - YA) > \alpha$
- ° $(\overline{B+C} - YA) > \beta$ * α and β are the prespecified values.

2) When resetting the BLC mode (both the expressions indicated below are satisfied):

- ° $(\overline{A+B} - YA) < \alpha'$
- ° $(\overline{B+C} - YA) < \beta'$ * α' and β' are the prespecified values.

$\overline{A+B} = (28YA+42YB)/70$, $\overline{B+C} = (42YB+186YC)/228$

(BLC mode operation)

The IRIS and ASC levels are controlled so that the YA level is set to 30% of the standard value. Note, however, that the IRIS level can be adjusted up to 'f' rating of 1.5 (approx. three times in YS) and the AGC level can be adjusted up to 1.2 times. (Maximum correction time: Approx. four seconds)

(2) Auto-tracking under back light condition

The auto-tracking auto-BLC function is implemented using the luminance difference maximizing method. As shown in Fig. I-14, when the BLC mode is taken in the center exposure metering area (1), the exposure metering frames (A and B) are shifted left/right per field (1/16 H, approx.) to detect YA, YB and YC. The auto-tracking is carried out in either of the following two manners.

1) When YB > YA and YC > YA:
It is judged that the main subject is relatively small. The exposure metering frames A and B are shifted together so that a difference between 'YA' and 'YB+YC' will be maximized.

2) When YA ≒ YB and YC > YA or YB:
It is judged that the main subject is relatively large. The exposure metering frames A and B are shifted together so that a difference between 'YA+YB' and 'YC' will be maximized.

Thus, even if the main subject moves left/right, the exposure metering frames follow it for auto-tracking BLC.

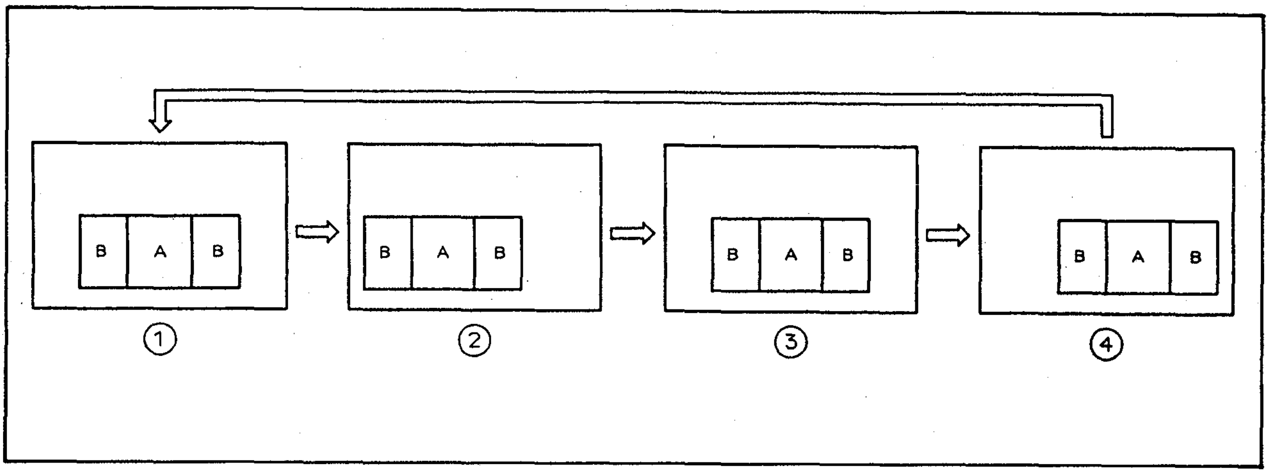
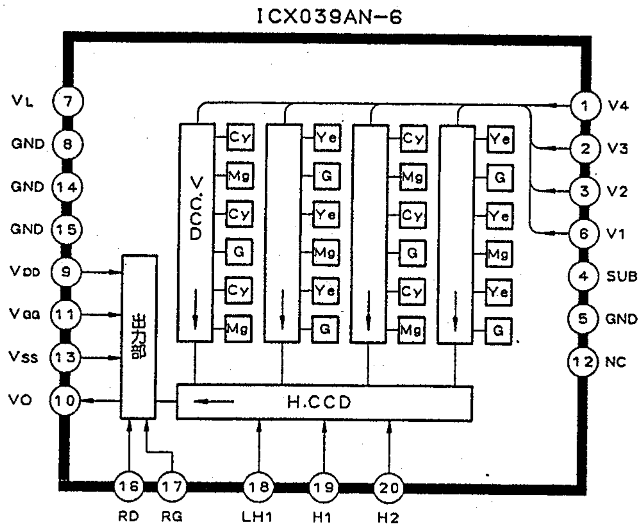


Fig. I-14

2-2 Camera section

2-2-1 Interline 470K-pixel CCD pickup

This comcorder is equipped with the solid-state CCD image sensor of interline type that does not have a charge storage area for high-speed electronic shutter. Featuring 470,000 pixels, it is capable of delivering high resolution of 450 horizontal lines (approx.) with a CAMERA EE OUT signal.


ICX039AN-6
VL 7
GND 8
GND 14
GND 15
VDD 9
VGG 11
VSS 13
VO 10
V.CCD
Cy
Mg
Ye
G
出力部
H.CCD
1 V4
2 V3
3 V2
6 V1
4 SUB
5 GND
12 NC
16 RD
17 RG
18 LH1
19 H1
20 H2

Pin No.	Name	Description
1	V4	V.CCD drive pulse (4)
2	V3	V.CCD drive pulse (4)
3	V2	V.CCD drive pulse (2)
4	SUB	C.B.A. (overflow drain)
5	GND	GND
6	V1	V.CCD drive pulse
7	VL	Transistor protect bias
8	GND	GND
9	VDD	Power source for output amplifier drain
10	VO	Signal output
11	VGG	Gate bias for output amplifier
12	NC	NC
13	Vss	Source for output amplifer
14	GND	GND
15	GND	GND
16	RD	Reset drain bias
17	RG	Reset gate pulse
18	LH1	H.CCD final stage drive pulse
19	H1	H.CCD drive pulse (1)
20	H2	H.CCD drive pulse (2)

Fig. I-15

° Charge transfer scheme

In this CCD pickup, the photoelectric charges stored with the photosensor element are all read out to the vertical transfer line once during the vertical blanking interval. Then, the charges are output successively over the horizontal transfer line on a two-by-two-line basis. So, this device is referred to as the interline-type CCD pickup. (In the two-by-two-line transfer operation, the odd-numbered and even-numbered fields are shifted one line position, and the top and bottom lines are added to prevent deterioration of vertical resolution.) This scheme of CCD is almost the same as that in Models E70 and 80. But, it provides the unique sequence that LH1 having same phase as H1 with different amplitude and DC is input at the final stage of horizontal transfer.

° Electronic shutter (principle)

This interline CCD has no charge storing section, however, the slow shutter speed (1/120, 1/250 etc.) can be performed without it in the following manners.

To store the necessary charge for shutter speed, the unnecessary charge except it is swept out from the sensor to the overflow drain (SUB) by the DC bias. (This DC bias applied to the overflow drain absorbes the unnecessary charge.) The stored necessary charge is read out to the VCCD by a read-out pulse.

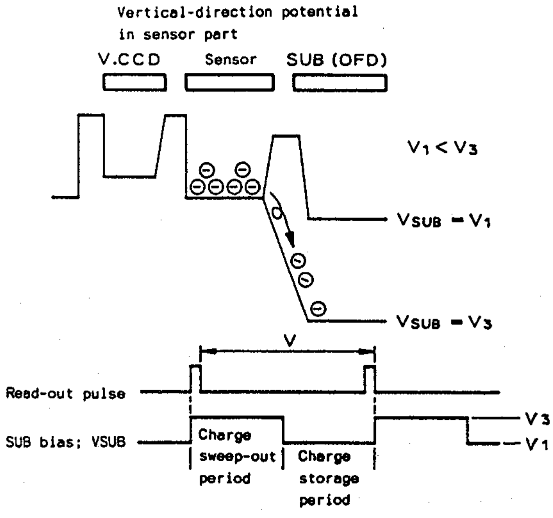

Vertical-direction potential in sensor part
V.CCD
Sensor
SUB (OFD)
V1 < V3
VSUB = V1
VSUB = V3
V
Read-out pulse
SUB bias; VSUB
Charge sweep-out period
Charge storage period
V3
V1

Fig. I-16

° Electronic shutter (control)

In this system, variable-speed electronic shutter operation is carried out by superimposing the charge sweep-out pulse over the SUB DC bias signal as shown in Fig. I-17. The charge sweep-out pulse having a width of approx. one microsecond is given per H (during horizontal blanking interval). The stored charge in the sensor is absorbed into the C.B.A. by this pulse during H period. According to the count of this pulse, the shutter speed is determined.
With this control approach, it is possible in principle to change a shutter speed within a range of 1/50 to 1/15625 second in increments of 1/15625 second.

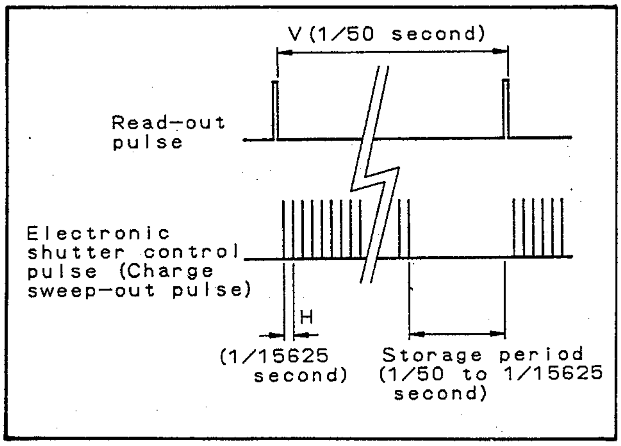

V (1/50 second)
Read-out pulse
Electronic shutter control pulse (Charge sweep-out pulse)
H
(1/15625 second)
Storage period (1/50 to 1/15625 second)

Fig. I-17

° Electronic shutter (circuit)

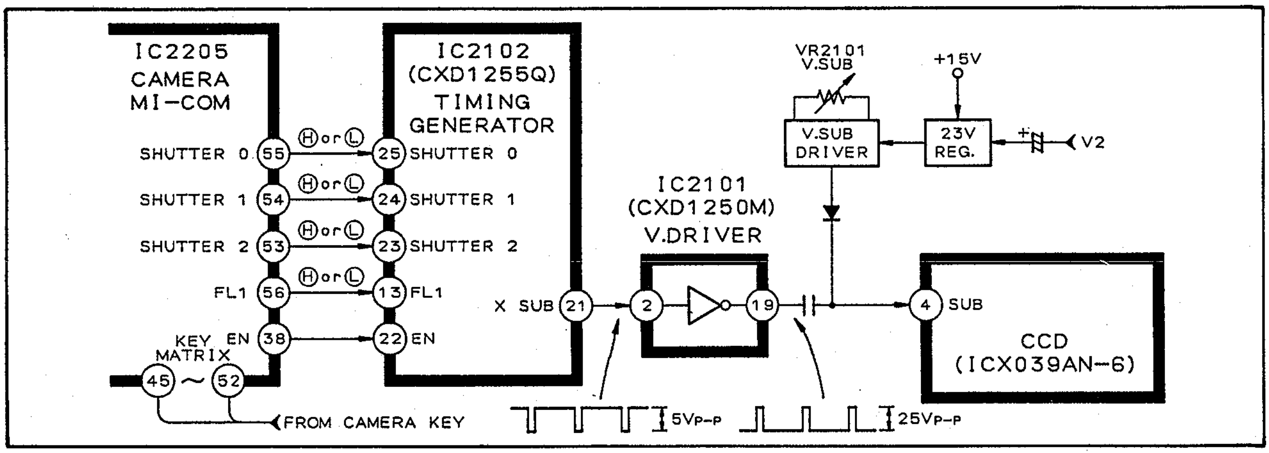

IC2205
CAMERA
MI-COM
SHUTTER 0
SHUTTER 1
SHUTTER 2
FL1
KEY EN
MATRIX
55
54
53
56
38
45
52
Ⓗor Ⓛ
FROM CAMERA KEY
IC2102
(CXD1255Q)
TIMING
GENERATOR
25 SHUTTER 0
24 SHUTTER 1
23 SHUTTER 2
13 FL1
22 EN
X SUB 21
5Vp-p
IC2101
(CXD1250M)
V.DRIVER
2
19
25Vp-p
VR2101
V.SUB
V.SUB
DRIVER
+15V
23V
REG.
V2
4 SUB
CCD
(ICX039AN-6)

Fig. I-18

Fig. I-18 shows the block diagram of electronic shutter circuit.

When a shutter speed is selected with the camera key, the relevant control signals are issued from pins 53, 54, 55, 56 and 38 of the CAMERA microcomputer (IC2205). (For the relationship between shutter speeds and control signals, see Tale I-6, P. 59)

Then, on receipt of these control signals, the IC2102 (timing generator) produces the electronic shutter control pulse XSUB (charge sweep-out pulse) from pin 21. The XSUB from IC2102 is inverted to 25 Vp-p at IC2101 (V.DRIVER), and it is mixed with the DC bias (V.SUB) of SUB. Then, it is applied to pin 4 of CCD to sweep out the stored charge in the sensor to the CCD C.B.A. for controlling the shutter speed. In normal speed mode (1/50), pin 21 of IC2102 goes high to supply DC bias (from V.SUB DRIVER) only to pin 4 of CCD.

° Comparison of CCD solid-state image pickups

Table I-1

	CCD in A1	CCD in A2
Number of pixels	Total : 420,000 pixels Effective: 400,000 pixels (582 x 681)*	Total : 470,000 pixels Effective: 440,000 pixels (582 x 752)*
Optical size	1/2 inch	1/2 inch
Pixel size	8.4 μm x 9.6 μm	8.3 μm x 8.6 μm
Chip size	6.82 mm x 7.85 mm	6.45 mm x 7.95 mm
Resolution	400 TV scanning lines	450 TV scanning lines
Memory bits	91 rows (45 lines)	None

* OB part excluded

2-2-2 Camera color signal processing

In this machine, the color signal (color difference sequential signal) is separated into red, green and blue once for gamma correction and white balancing. Then, conversion to color difference signal is carried out through the matrix circuit. Thus, by performing the various correction in RGB, the color reproduction not affected by change in the color temperature or luminance is ensured. Fig. I-19 shows the block diagram of camera signal processing circuit.

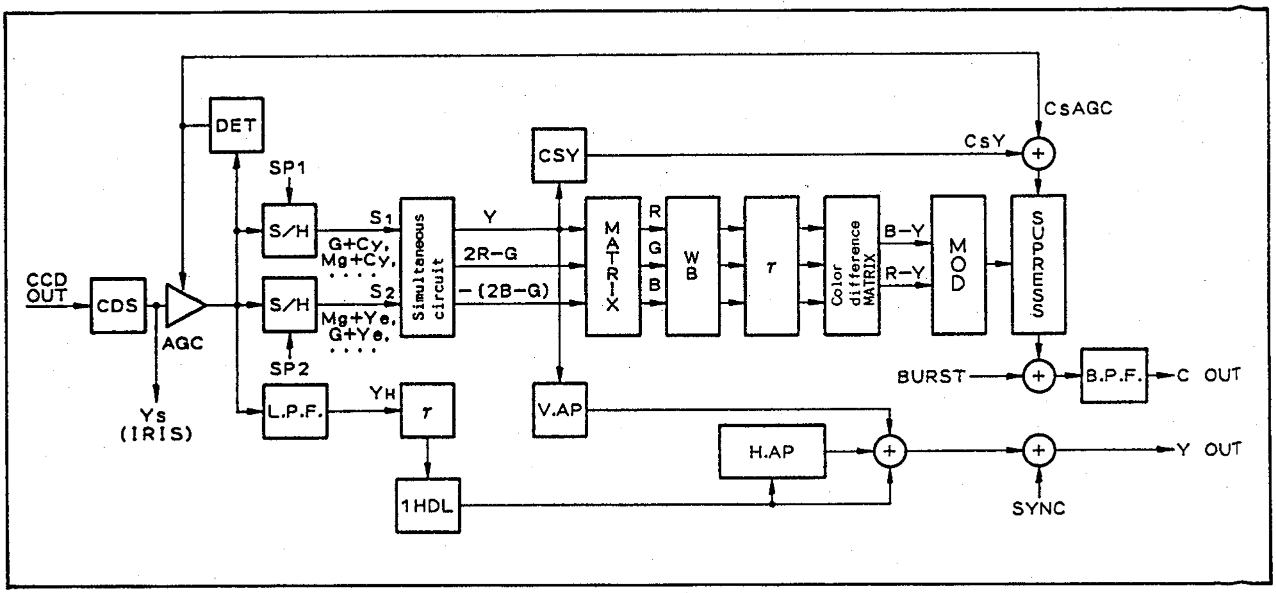

CCD OUT
CDS
AGC
Ys (IRIS)
DET
SP1
S/H
S1
G+Cy, Mg+Cy, ...
S/H
S2
Mg+Ye, G+Ye, ...
SP2
L.P.F.
YH
γ
1HDL
Simultaneous circuit
Y
2R-G
-(2B-G)
CSY
MATRIX
R
G
B
WB
γ
Color difference MATRIX
B-Y
R-Y
MOD
SUPRESS
CsAGC
CsY
BURST
B.P.F.
C OUT
V.AP
H.AP
Y OUT
SYNC

Fig. I-19

As in the conventional scheme, the CCD output signal is subjected to correlated double sampling (CDS) and holding and then it is applied ot the AGC circuit.

(1) Arrangement of Y signal and chroma (color difference) signal

Fig. I-20-1 shows the CCD color filter formation made for individual pixels.

To accomplish interlaced scanning, the mixing operation is performed on a pair of charges such as 'A1' or 'A2' in field A (on a pair of charges such as 'B' in field B). Therefore, on A1 line, the charges coming out of the H register correspond to the Mg+Ye and G+Cy signals. These signals are processed to provide the Y and chroma signals, i.e. the adjacent pairs are added for the Y signal, and subtracted for the chroma signal.

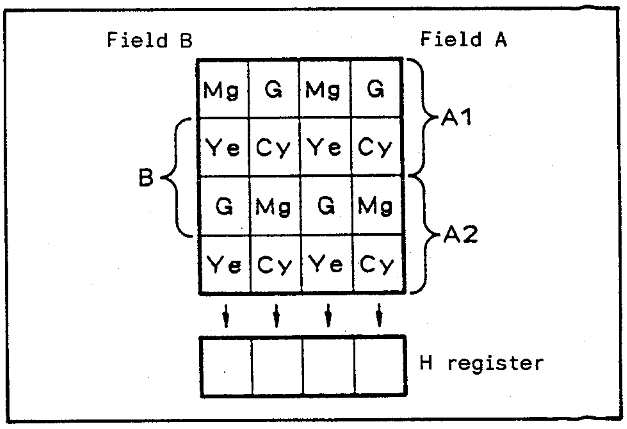

Field B
Field A
Mg
G
Mg
G
Ye
Cy
Ye
Cy
G
Mg
G
Mg
Ye
Cy
Ye
Cy
A1
A2
B
H register

Fig. I-20-1

(A1 line)

On A1 line, approximation can be expressed as indicated below.

° $Y = \{(Mg+Ye)+(G+Cy)\} \times 1/2 = 1/2\,\underline{\{2B+3G+2R\}}$
° $R-Y = \{(Mg+Ye)-(G+Cy)\} = \underline{(2R-G)}$

On A2 line, the charges coming out of the H register correspond to the G+Ye and Mg+Cy signals. In the same manner as for A1 line, addition and subtraction are performed on these pairs.

(A2 line)

On A2 line, approximation can be expressed as indicated below.

° $Y = \{(G+Ye)+(Mg+Cy)\} \times 1/2 = \underline{1/2\{2B+3G+2R\}}$
° $B-Y = \{(G+Ye)-(Mg+Cy)\} = G-2B = \underline{-(2B-G)}$

For the Y signal, the same result can be obtained on both A1 and A2 lines. For the chroma signal, however, the R-Y and -(B-Y) signals are taken out alternately per H on a line sequential basis. In field B, the same operation is carried out also.

(2) Chroma signal separation

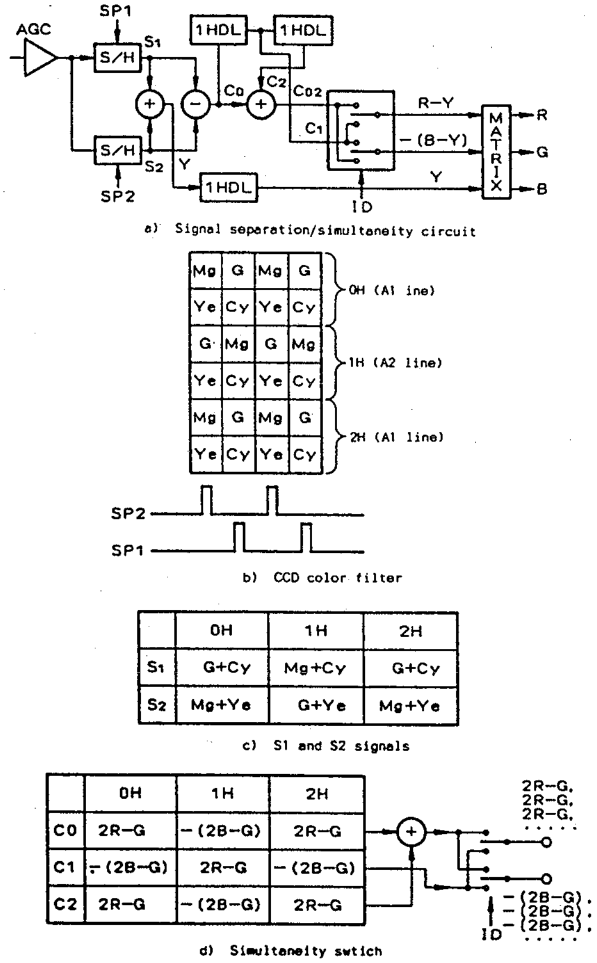
The following describes the chroma signal separation scheme through use of Fig. I-20-2. On 0H line (A1 line), the output signal S1 sampled and held with SP1 corresponds only to the G+Cy signal, and the output signal S2 sampled and held with SP2 corresponds only to the Mg+Ye signal. The Y and chroma signals are extracted by adding and subtracting these S1 and S2 signals as mentioned in the foregoing.

On 1H line (A2 line) and 2H line (A1 line), the Y and chroma signals are separated in the same fashion also.

(3) Simultaneity of chroma signals

The line-sequential chroma signals thus attained are fed to the simultaneity circuit to provide a continuous stream of color difference signals.

For this purpose, the C1 signal with 1H lag behind C0 and the C2 signal with 2H lag behind it are generated through the two 1HDL circuits. The C1 signal is applied to the one side of the simultaneity switch, and the C02 signal attained by averaging C0 and C2 is applied to the other side. In this state, the simultaneity switch is changed over using the ID pulse that inverts per H. Thereby, the 2R-G signal always appears at the one output terminal and the -(2B-G) signal always appears at the other output terminal.



a) Signal separation/simultaneity circuit

Mg	G	Mg	G
Ye	Cy	Ye	Cy
G	Mg	G	Mg
Ye	Cy	Ye	Cy
Mg	G	Mg	G
Ye	Cy	Ye	Cy

b) CCD color filter

	0H	1H	2H
S1	G+Cy	Mg+Cy	G+Cy
S2	Mg+Ye	G+Ye	Mg+Ye

c) S1 and S2 signals

	0H	1H	2H
C0	2R-G	-(2B-G)	2R-G
C1	-(2B-G)	2R-G	-(2B-G)
C2	2R-G	-(2B-G)	2R-G

d) Simultaneity swtich

Fig. I-20-2

(4) R, G and B signals (Matrix)

The R, G and B video signals are produced in the matrix circuit using the Y signal that contains (2R-G)=CR, -(2B-G)=CB, S1 and S2 signals. This operation can be expressed theoretically as indicated below.

$$R = CR+0.12Y$$
$$B = -CB+0.20(Y-CR)$$
$$G = Y-CR+CB$$

The R, G and B signals thus produced are subjected to white balance correction, gain control and gamma correction, and then fed to the color difference matrix circuit.

(5) Color difference matrix (Color Difference Matrix)

Using the R, G and B signals, the G-R and G-B signals are generated. Using these signals, the following color difference signals are formed.

$$R-Y = 0.11(G-B)-0.7(G-R)$$
$$B-Y = 0.3(G-R)-0.89(G-B)$$

Then, after undergoing hue adjustment and gain control, the above signals are output as the R-Y and B-Y signals.

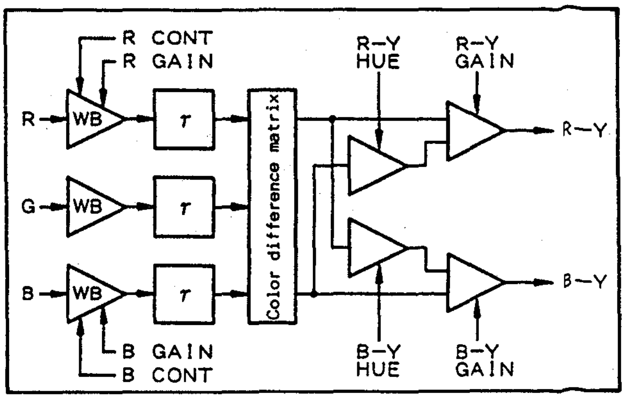

R CONT
R GAIN
R—Y HUE
R—Y GAIN
R
WB
γ
Color difference matrix
R—Y
G
WB
γ
B
WB
γ
B—Y
B GAIN
B CONT
B—Y HUE
B—Y GAIN

Fig. I-21

(6) Chroma signal output (MOD, OUT)

After color difference operation, the chroma signal processing is carried out in the same manner as in the conventional circuit. For modulation of the color difference signals, the subcarrier is applied by using the 1/4 frequency divider in the 4 fsc clock modulating IC and the signal for line alternation from the sync generator.

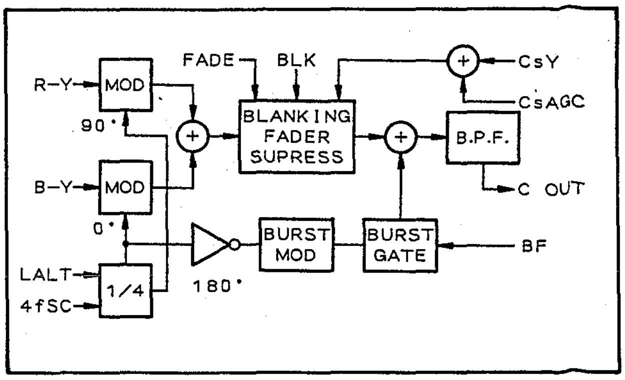

FADE
BLK
CsY
CsAGC
R—Y
MOD
90°
+
BLANKING FADER SUPRESS
+
B.P.F.
B—Y
MOD
C OUT
0°
BURST MOD
BURST GATE
BF
LALT
4fSC
1/4
180°

Fig. I-22

2-2-3 Hybrid automatic white balance

The white balance function in this machine is designed based on the AWB scheme employed in Model A1. For improvement in color reproduction (1), the external WB sensor (absorbed into IC) manufactured by Canon is equipped to provide higher sensitivity (2), and the TTL (internal measurement) axis is redesigned to allow proper correction even in a situation where the lighting on the subject is significantly different from that around the camcorder.

(1) External WB sensor IC

° Higher sensitivity

In the external WB sensor circuit, the photodiode signal furnished to the logarithmic amplifier is weak and susceptible to noise. This characteristic is one of the major determinants of sensitivity (minimum working illuminance for AWB function).

In Model A1, the photodiode and logarithmic amplifier have been mounted as separate parts vulnerable to noise, and the WB sensor unit had to be shielded to protect against electromagnetism.

In this machine, the photodiode and logarithmic amplifier are mounted on the same IC chip (WB sensor IC). This circuit design increases immunity to noise, eliminates the necessity of electromagnetic shielding, and enhances sensitivity in shooting under low illuminance.

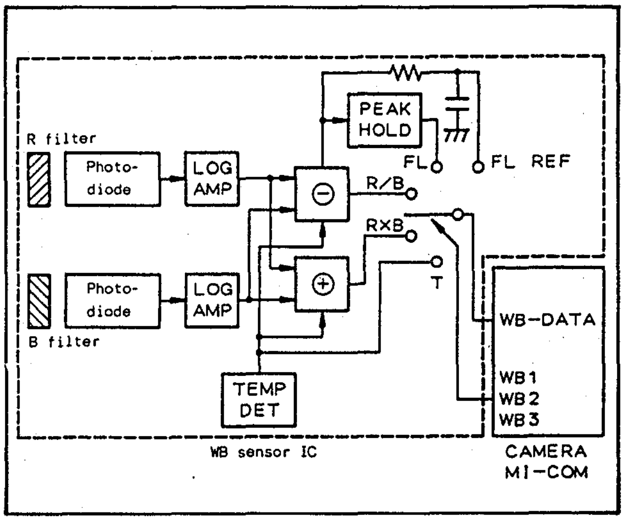


Fig. I-23

° WB sensor output

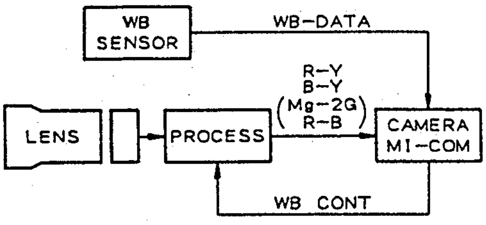
The WB sensor delivers five output signals; RxB, R/B, FL, FL REF, and T signals. The RxB and R/B signals are used for color temperature/luminance detection as in Model A1. The FL and FL REF signals are output for flicker detection under fluorescent lighting. And, the T signal is delivered for color temperature correction, i.e. it is used for correction in color temperature detection conducted by the CAMERA microcomputer.

These five output signals are selected by the WB1, 2 and 3 signals furnished from the CAMERA microcomputer. And, the selected output signal is sent as the WB-DATA signal to the CAMERA microcomputer over a single line.

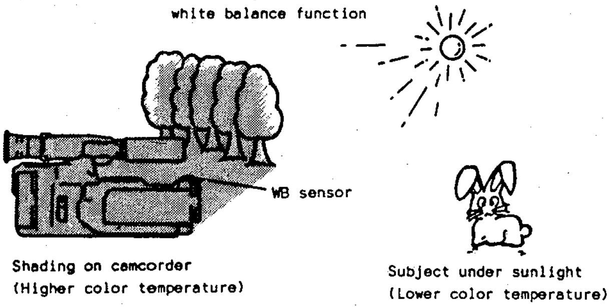
(2) Modification of TTL axis

With the AWB function in Models A1 and A2 Hi, the external WB sensor detects a color temperature of the light around the camcorder to accomplish single-axis correction. Then, based on the TTL principle, a color temperature of the subject is detected and two-axis correction is carried out within the limited control range for white balancing. (See Fig. I-24-c.) In this scheme, proper color temperature correction can be made even if the color temperature of the light around the camcorder is different from that on the subject (Fig. I-24-b). This excellent feature, however, cannot be fully unleashed if the TTL control range is insufficient.

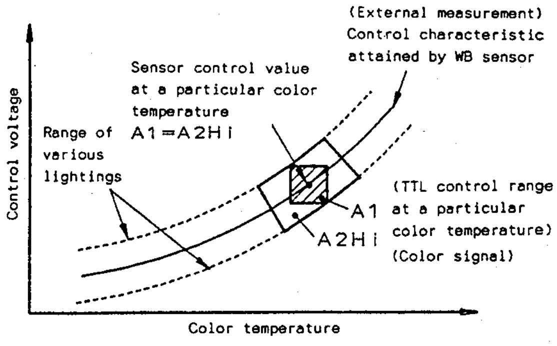
To take full advantage of this feature, the TTL control range in Model A2 Hi is widened as shown in Fig. I-24-c.


WB SENSOR
WB-DATA
R-Y
B-Y
(Mg-2G R-B)
LENS
PROCESS
CAMERA MI-COM
WB CONT

a. Block diagram of white balance function


WB sensor
Shading on camcorder
(Higher color temperature)
Subject under sunlight
(Lower color temperature)

b. Different color tempeatures at camcoder position and subject position

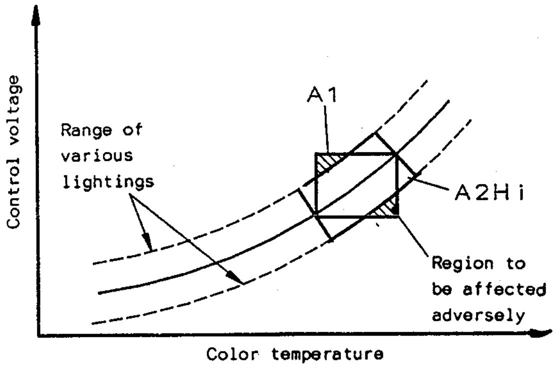


c. Color temperature control chracteristic

Fig. I-24

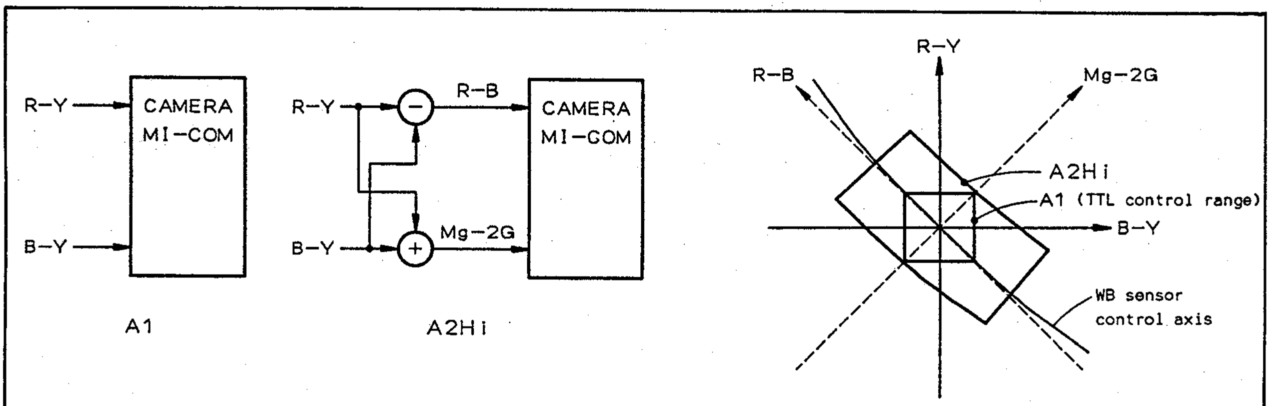
° Wider TTL control range

In Model A1, the R-Y and B-Y signals have been used for TTL operation. Therefore, with the limited TTL control range, it is represented by a rectangle inclined with respect to the control characteristic of WB sensor as shown in Fig. I-24-c. (As indicated in Fig. I-26-b, the WB sensor control axis is inclined in vector with respect to the R-Y and B-Y axes.) Therefore, as shown in Fig. I-25, if the TTL control range is widened in Model A1, the upper and lower limits of various lightings are exceeded to increase a region to be affected adversely.
It is for this reason that the TTL control range could not be expanded in Model A1.



In case TTL control range is widened

Fig. I-25


R–Y
CAMERA
MI–COM
B–Y
A1
R–Y
R–B
CAMERA
MI–COM
Mg–2G
B–Y
A2Hi
R–Y
R–B
Mg–2G
A2Hi
A1 (TTL control range)
B–Y
WB sensor
control axis

a. Signals used for TTL control

b. White balance correction vector

Fig. I-26

In Model A2 Hi, the R-B and Mg-2G signals are used for TTL control (see Fig. I-26-a). Thereby, the TTL control range can be made rectangle along the WB sensor control axis (Fig. I-24-c), allowing expansion of the TTL control range within the upper and lower limits of various lightings. (As indicated in Fig. I-26-b, the R-B axis is parallel with the WB sensor control axis and the Mg-2G axis is orthogonal to it. Therefore, the TTL control range is positioned along the WB sensor control axis.)

Without increasing a region to be affected adversely, the TTL control range can be widened in Model A2 Hi. This makes it possible to carry out proper color temperature correction even in a situation where the color temperature of lighting around the camcorder is different from that on the subject.)

2-3 Digital signal processings

2-3-1 Outline

Fig. I-27 is the system block diagram of the digital signal processor circuit.

At camera REC time, the output signal from camera block is input to the digital block, and, after the processing, it is output to a recorded signal processing circuit of recorder video block. Y-signal (luminance signal) and C-signal (color signal) are input to digital block separately, and are quantized by respective A/D converter. In order to prevent degradation of video signal by Hi8, the sampled frequency is set at 640 fH (10 MHz) for Y and 4 fsc (17.7 MHz) for C, and quantum bits are set at 8 bit for Y and 6 bits for C. The A/D converted video signal is, after digital signal processing, demodulated into analog signal by D/A converter and output. The C signal is decoded into R-Y and B-Y color difference signals once for the digital signal processing, and then encoded again into carrier color signal. The memory IC does field memory by using a 1M bit DRAM for Y and C signals. At zoom up motion time, the Y signal and the C signal are multiplexed for 1H delay processing with one 1H-line memory.

Operation specification:

° Signal input/output mode ..... Separation of luminance and carrier color signal.
° Sampled frequency .... Y: 640 fH (10 MHz)
C: 4 fsc (17.7 MHz)
° Number of quantized bit ...... Y: 8-bit
C: 6-bit (Interior 7-bit D/A 2-phase base band signal)
° Signal bandwidth .... Y: 4 MHz
C: 0.5 MHz (base band basis)

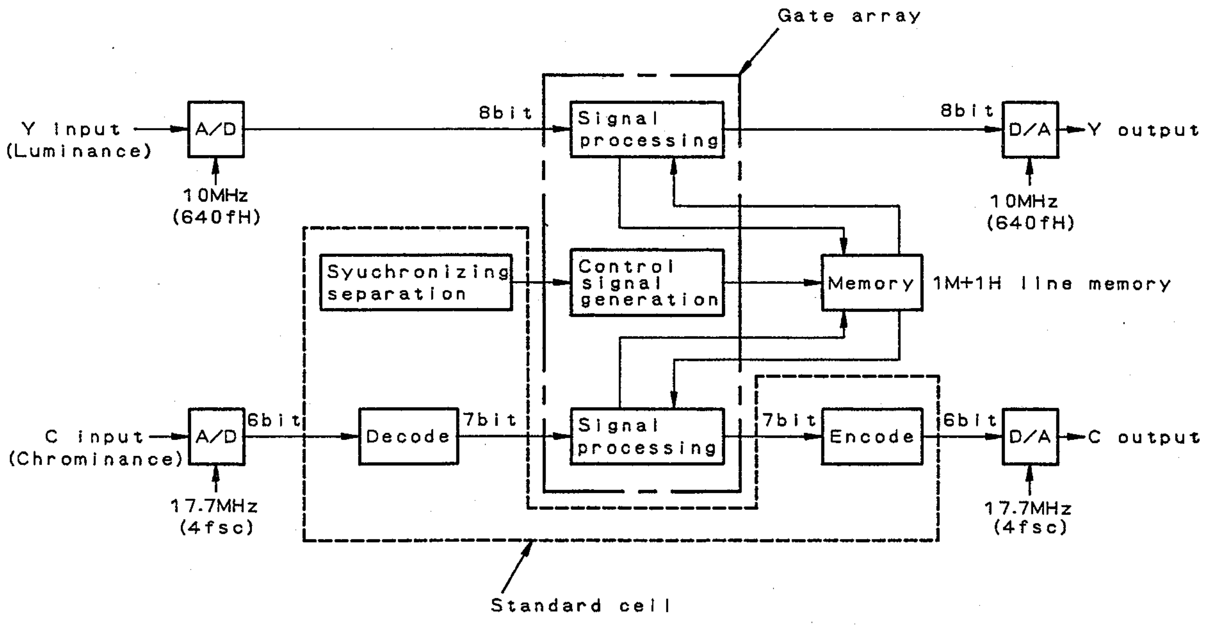

Gate array
Y input
(Luminance)
A/D
10MHz
(640fH)
8bit
Signal processing
8bit
D/A
Y output
10MHz
(640fH)
Syuchronizing separation
Control signal generation
Memory
1M+1H line memory
C input
(Chrominance)
A/D
6bit
17.7MHz
(4fsc)
Decode
7bit
Signal processing
7bit
Encode
6bit
D/A
C output
17.7MHz
(4fsc)
Standard cell

Fig. I-27

2-3-2 Technical aspect of digital function

As the digital functions, this model have (A) recording function.

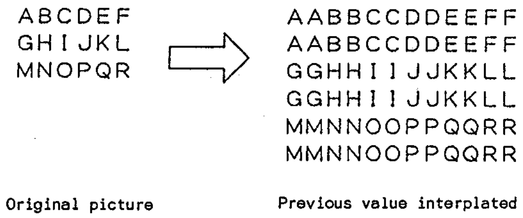
(A) The recording function includes (1) Close-up (2) Overlap (3) Freeze (4) Art freeze (5) Slow shutter.

The camera digital functions are briefly explained as follows:

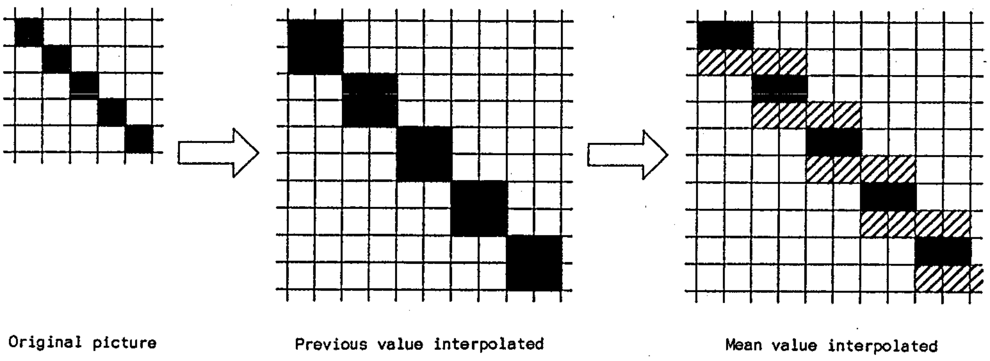
(1) Close-up

This function is to double the central part of picture. It is theoretically explained as follows: As in the Fig. I-28 (a), the central part of picture (picture element) digitally-memorized is scanned twice in horizontal direction while in vertical direction it is scanned twice to obtain a close-up picture. (It is called "pre-interpolate processing" in general.)

By this method, there is no problem when the edge of the subject is horizontal or vertical, but when it is slanting, it takes a stair form resulting in degradation of picture quality. This model makes this strairway lines insignificant and the recording of picture natural by mean value interpolation.


ABCDEF
GHIJKL
MNOPQR
AABBCCDDEEFF
AABBCCDDEEFF
GGHHIIJJKKLL
GGHHIIJJKKLL
MMNNOOPPQQRR
MMNNOOPPQQRR
Original picture
Previous value interplated

(a) Mechanism of previous value interpolation


Original picture
Previous value interpolated
Mean value interpolated

(b) Mechanism of mean value interpolation

Fig. I-28

(2) Overlap

In this function, the preceding latest scene (still picture memorized in field memory) is playbacked at the start of recording, and it gradually changes to the normal motion picture. This overlap mode is effective only on picture. (Sound is not faded) The overlap function is provided to check pictures memorized in field memory, and to rehearsal (demonstration) at shops without a cassette.

(Normal overlap operation)

1) Overlap mode is set by pushing an overlap key ("OVERLAP" indication is displayed on LCD).
2) When REC mode is turned to REC. PAUSE mode by pushing a trigger button, the camera EE picture at this time is taken into the field picture (memorized as still picture).
3) By resuming the camera shooting by pushing the trigger button again, the overlap functions, and EE picture switches to memory picture (still picture memorized in field memory), and then gradually returns to EE picture.

This overlap may continue until the overlap mode is released by pushing the clean key. As the overlap time of memory picture and EE picture is 3 seconds, the interval recording time, when interval timer is simultaneously used, will be from about 5 seconds to 3 seconds.

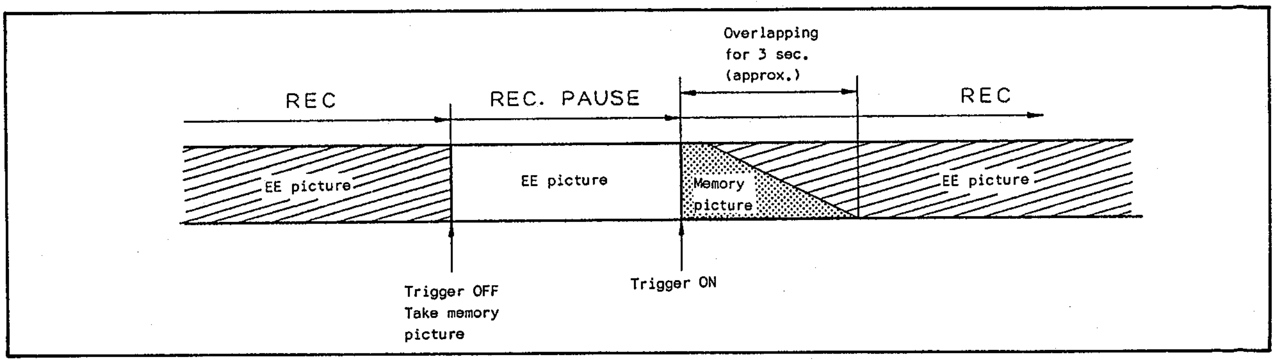

Overlapping
for 3 sec.
(approx.)
REC
REC. PAUSE
REC
EE picture
EE picture
Memory
picture
EE picture
Trigger OFF
Take memory
picture
Trigger ON

Fig. I-29

(Checking overlap memory)

Memory check is provided to confirm the picture recorded in field memory. The picture and the overlap function can be confirmed by manipulating the overlap key at REC. PAUSE mode (the operation manual calls this "rehearsal").

* Conditions: The picture should be taken in the memory in overlap mode.

Procedures:
1) Push the overlap key at REC. PAUSE mode to set the memory check mode. Then, the memory picture taken in the memory is output. Memory picture is output as long as the overlap key is pushed.
2) Release the overlap key. Then the overlap motion starts, and gradually switches to EE picture.

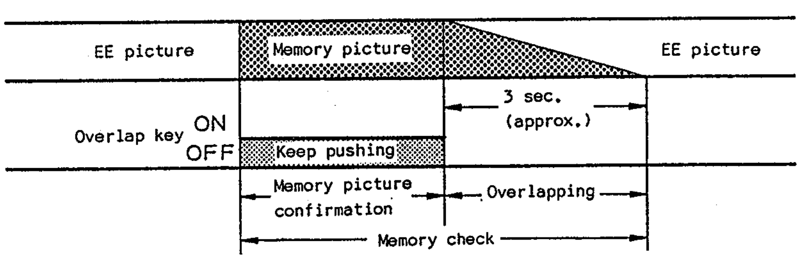

REC PAUSE
EE picture
Memory picture
EE picture
3 sec.
(approx.)
Overlap key
ON
OFF
Keep pushing
Memory picture
confirmation
Overlapping
Memory check

Fig. I-30

(Rehearsal mode of overlap)

This rehearsal mode is provided for tapeless overlap demonstration at shops, but also it can be applied for user's confirmation.

* Conditions: Digital mode is cleared, and top is not mounted and is in a stop condition.

Procedures:

1) Push the overlap key to set the rehearsal mode. The EE picture is taken into memory, and the memory picture taken then is output. Memory picture is output as far as the overlap key is pushed.
2) Release the overlap key. Then the overlap motion starts, and gradually switch to EE picture.

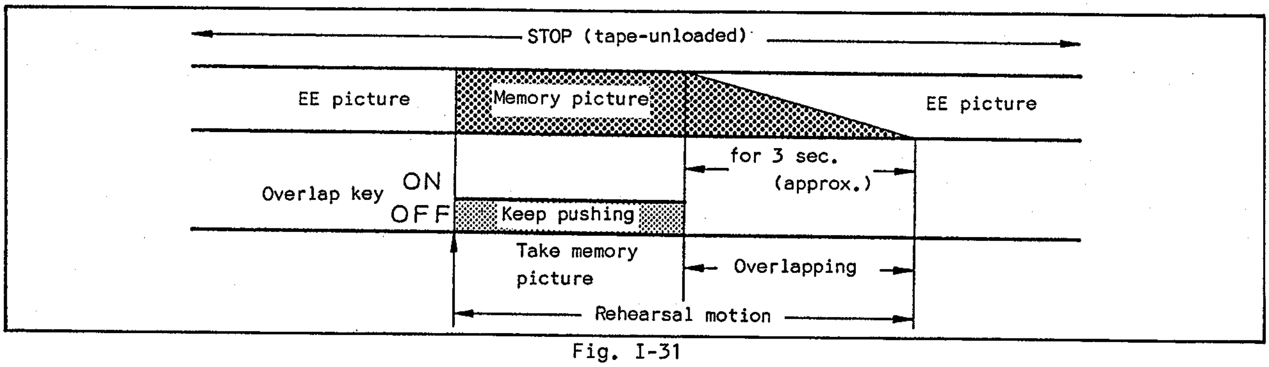


Fig. I-31

(3) Freeze

By pushing a freeze key once, the freeze mode is set ("FREEZE" displayed). In this mode, the EE picture (motion picture) is memorized as a still picture, and memory picture (still picture) is output. The sound is recorded.

Then, by pushing the freeze key again in freeze mode, the new EE picture is memorized and output. When the freeze key is pressed over a second, the picture equivalent to striking key 6 strokes per second (stroboscopic effect picture) is recorded.

When the interval timer is used, the freeze picture memorizes new picture each time, and interval timer recording of perfectly still picture become possible.

(4) Art freeze

This takes the same action as above, except, when memory picture memorized in memory is output, Y signal (luminance signal) information with 8-bit's lower 5-bit is reduced to output artistic still picture.

(5) Slow shutter

Ordinarily, electric charge of CCD photo-diode is read out by adding pulse every 1/50 second. For slow shutter mode, the reading pulse interval is prolonged to 1/25, 1/12, 1/8, 1/6 seconds so as to extend electric charge accumulating time. The picture, the electric charge of which has been read out, is taken into memory so that the memory picture is output until the next read out action.

The slow shutter does not work while high speed electronic shutter is used.

At such mode, AF motion stops, and ranging frame does not displayed.

2-4 Superiority in sound quality and functionality

In general, the microphone audio system of video camera and recorder incorporates the ALC (Automatic level control) circuit so that any excessively loud noise entering microphone is levelled down to the extent the waveform is not distorted, and controlled at a level to be comfortably heard. Therefore, the sound of a playback of rocket fireworks scene used to be not as loud as the real one, and the sound of an approaching train would not rise over a certain level and would not as impressive as the real scene.

To improve the above audio system, this model has added the following functions to reinforce and upgrade the sound quality as an AFM HiFi stereo recording corresponding to high quality picture Hi8:

1) Attenuator (-20 dB) inserting SW.

2) Mechanism for adjusting recording sound level.

3) Recording sound level meter (LDC). Peak holding (with about 1 second).

4) Mechanism of external microphone preference (A circuitory structure which automatically disconnects the internal microphone when an external microphone is connected which will serve in its full function).

5) Headphone terminal with level adjusting volume.

Fig. I-33 shows the block diagram of audio circuit.

The operation of audio circuit of this model are roughly divided into camera mode and line mode. Further, the camera mode is divided into automatic mode and manual mode.

2-4-1 Outline

- ° Only internal microphone passes through HPF to cut the unnecessary low band (65 Hz on below).

- ° When the external microphone is plugged the signal switches to the external microphone, and it goes through the HPF and is output for full play to its characteristic function.

- ° Microphone signal goes to limiter circuit and enters the amplifier. (Ordinary gain, -20 dB gain by attenuater position.)

- ° The signal which came out of microphone amplifier passes through LPF which removes high band, and becomes microphone signal, as follows:

(1) Automode (stereo)

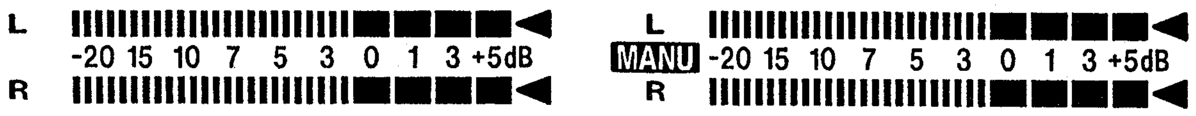
This is the conventional mode. By amplifying and detecting the microphone signal, the control voltage is generated. This is input to the limiter circuit at the front stage of amplifier in order to control the microphone signal to avoid the distortion. By power supply, the auto mode is automatically set, and "MANU" is not displayed in audio level meter. (Fig. I-32 (a))

(2) Manual mode (stereo)

Manipulation of (upper body) microphone level A/M key (equipped on the upper body) switches to manual mode. During the manual mode, "MANU" is displayed at an audio level meter, and the recording sound level is adjusted by REC. VOL. latch. (Fig. I-32 (b))

In manual mode, the aforementioned limiter circuit is turned off, and the input signal is amplified at a certain rate of gain. In such manual mode, the recording sound level may be adjusted with REC. VOL. as the signal enters REC. VOL. via LPF.

The REC. VOL. should be set in such a way that the loudest sound level does not exceed 0 ~ +3 dB. If +5 dB level is indicated, the attenuator (ATT) should be switched to 20 dB side.



(a) Auto mode

(b) Manual mode

Fig. I-32

(3) How to use attenuator switch

ATT SW operates in auto mode and manual mode for reducing the microphone amplifier gain by 20 dB. The features of and how to use this SW are as follows:

(Auto mode)

When the sound heard is too loud:

1) By using this mode when the average level of input is high and limiter is constantly working (level meter constantly indicates +3 dB or more), the variation of sound level becomes natural and the noise of microphone amplifier may be reduced.

2) By using this mode in recording escalating sound level such as of fireworks at which time the limiter is constantly working, the recording is done without narrowing dinamic range.

(Manual mode)

Used when the input signal is large.

When input signal is large, the output distortion is sometimes not corrected by reducing REC. VOL.; This is when distortion is generated by saturated front step microphone amplifier of REC. VOL. which is caused excessive gain of microphone amplifier relative to microphone input. Then recording with less distortion may be achieved by preventing saturation with reduced gain of microphone amplifier by use of attenuator.

2-4-2 Level indicator

By amplifying and detecting the output signal (Rch, Lch) of matrix circuit, the DC voltage according to specific level is obtained. This signal is input to microcomputer through DC amplifier for matching the A/D converter in the next step. In the microcomputer, the DC sound level read by the A/D converter is compared with the table inside to prepare the data as to what segment is to light which is transmitted to LCD controlled microcomputer. The display microcomptuer lights the level indicator according to such data, holding its peak per each second.

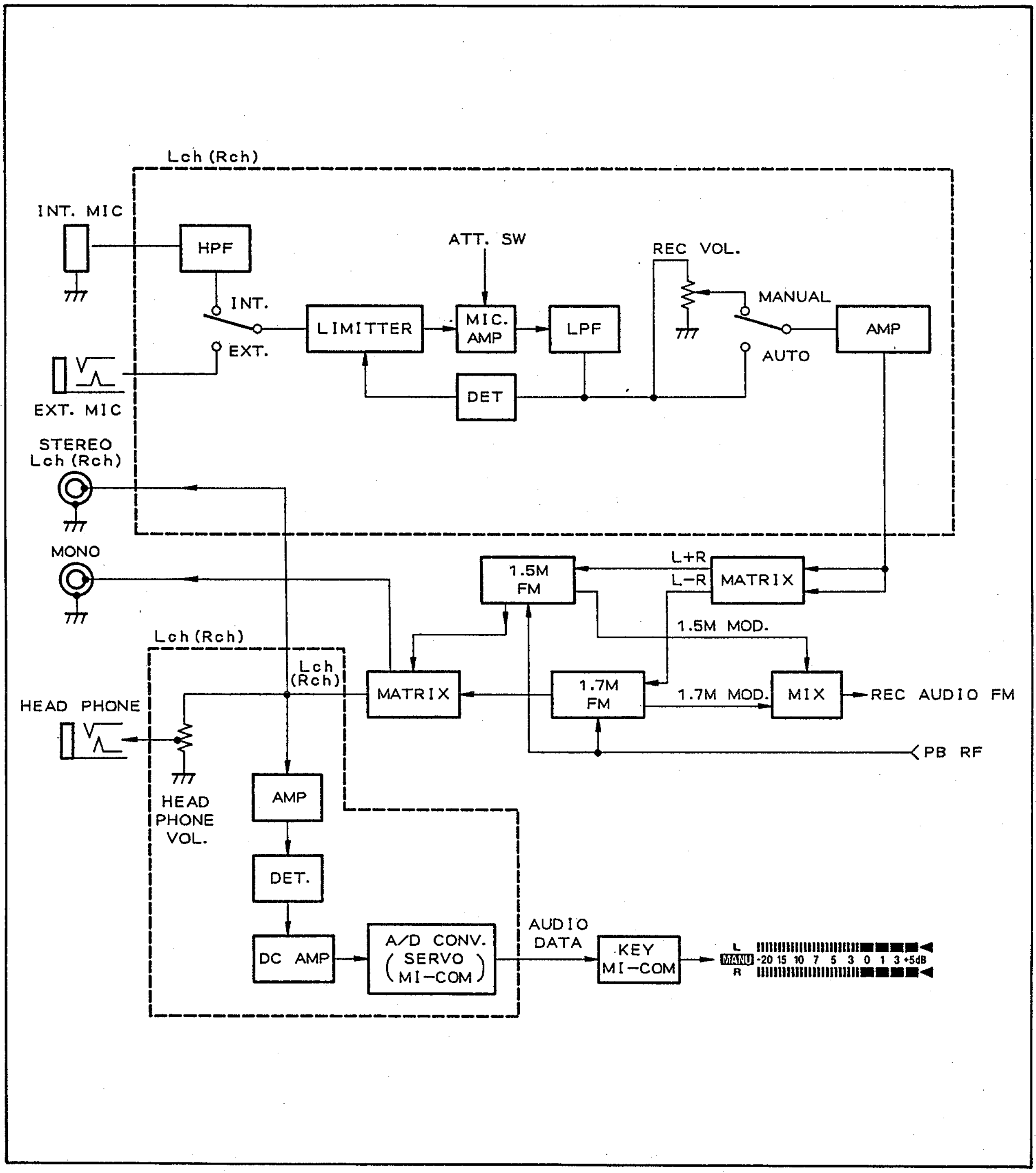

Lch (Rch)
INT. MIC
HPF
ATT. SW
REC VOL.
INT.
MANUAL
LIMITTER
MIC. AMP
LPF
AMP
EXT.
AUTO
DET
EXT. MIC
STEREO Lch (Rch)
MONO
1.5M FM
L+R
L−R
MATRIX
1.5M MOD.
Lch (Rch)
Lch (Rch)
HEAD PHONE
MATRIX
1.7M FM
1.7M MOD.
MIX
REC AUDIO FM
PB RF
HEAD PHONE VOL.
AMP
DET.
DC AMP
A/D CONV. (SERVO MI-COM)
AUDIO DATA
KEY MI-COM
L
R
MANU
-20 15 10 7 5 3 0 1 3 +5dB

Fig. I-33

3. Circuit Description

3-1 Auto-focus circuit

3-1-1 Circuit configuration

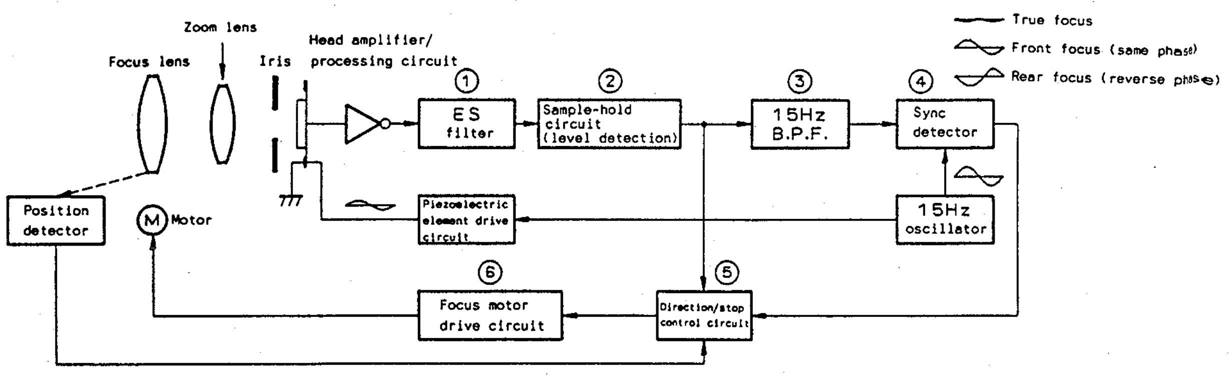

Zoom lens
Focus lens
Iris
Head amplifier/ processing circuit
①
ES filter
②
Sample-hold circuit (level detection)
③
15Hz B.P.F.
④
Sync detector
True focus
Front focus (same phase)
Rear focus (reverse phase)
Position detector
M Motor
Piezoelectric element drive circuit
15Hz oscillator
⑥
Focus motor drive circuit
⑤
Direction/stop control circuit

Fig. I-34

(1) The edge component of the subject image picked up with CCD is taken out through the ES filter.

(2) The peak level of ES signal is sampled and held (per V) to provide an ES value.
Since the piezoelectric element is constantly oscillated back and forth at 15 Hz, the ES value level varies in one of the following three fashions according to the position of focus lens.

1) When the focus lens is in the front-focus state;
The ES signal level varies in phase with the piezoelectric drive signal.

2) When the focus lens is in the true-focus state;
Variations in the ES signal level and piezoelectric drive signal are insignificant or zero.

3) When the focus lens is in the rear-focus state;
The ES signal level varies in reverse phase to the piezoelectric drive signal.

(3) The ES value component is passed through the 15 Hz band-pass filter to extract only its level variations due to piezoelectric driving.

(4) Synchronism detection with the piezoelectric drive pulse is carried out. If the in-phase condition is found, the front-focus signal is output. If the reverse-phase condition is found, the rear-focus signal is output. Or, if the output is insignificant or zero, the true-focus signal is given.

(5) According to the synchronism detection output and the focus lens position data, the rotational direction/stop signal is fed to the focus motor drive circuit. Also, the motor speed is controlled using the ES value level attained through sampling and holding.

(6) The focus motor is driven with the rotational direction signal or halted with the stop signal.

If the subject image is defocused significantly, it may be impossible to deliver the ES value. Therefore, the low-pass filter is equipped to detect the direction with its output, and also the rangefinding accuracy is enhanced in the manner mentioned below. With the output signal that has passed through this low-pass filter, a CU (climb up) value is attained.

(1) Oscillation of the piezoelectric element is changed according to the lens focal length and aperture diameter. (If the depth of field is long, the oscillating magnitude of piezoelectric element is increased.)

(2) In the true-focus state, the oscillating magnitude of piezoelectric element is decreased. And, in the out-of-focus state, it is increased.

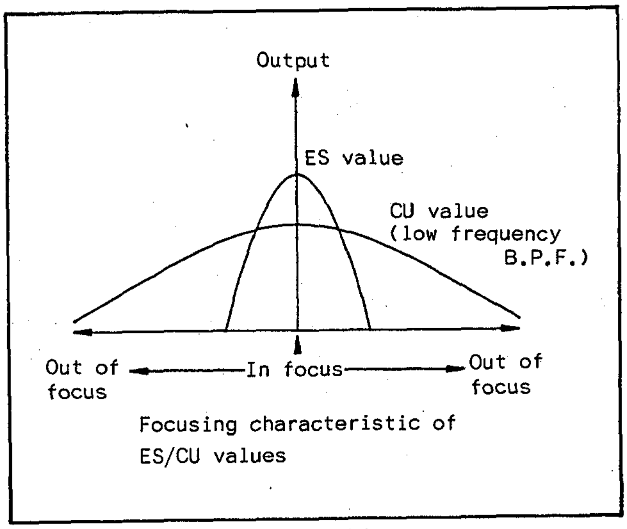
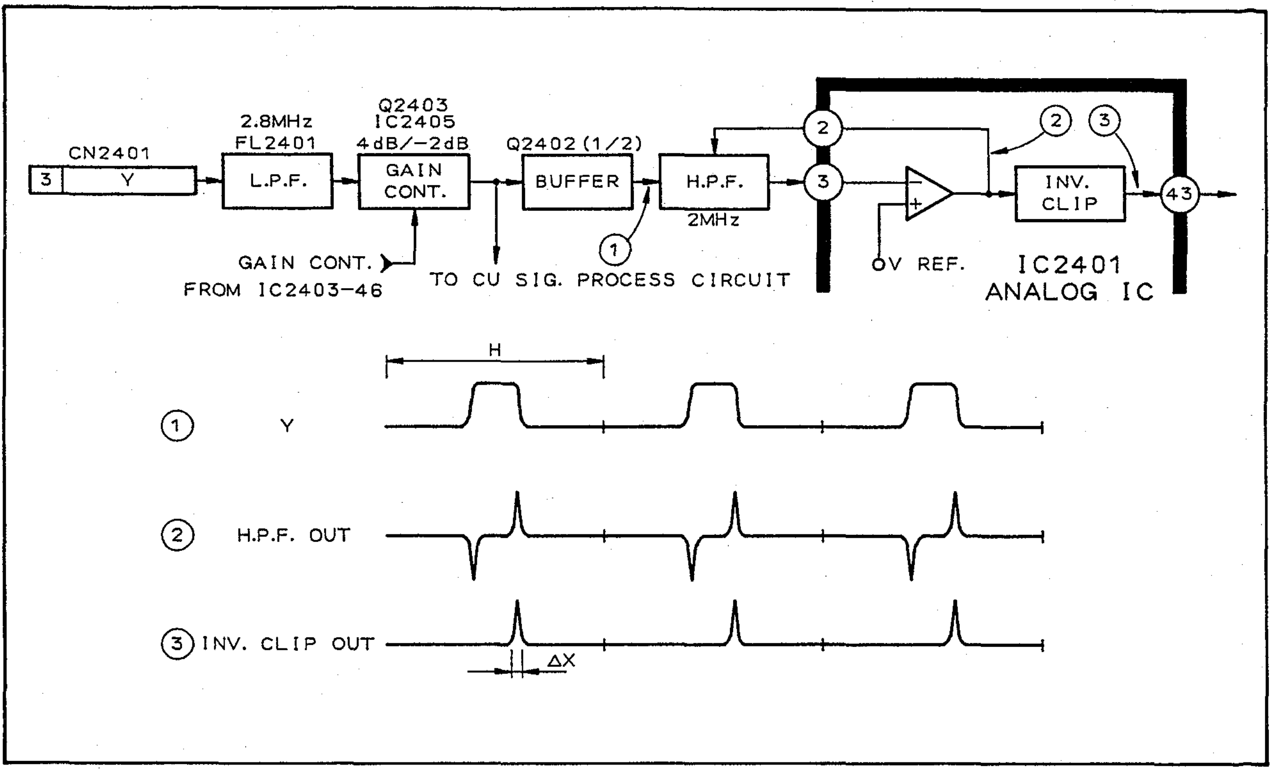


Fig. I-35

3-1-2 ES signal flow

(1) Input circuit



CN2401
3
Y
2.8MHz
FL2401
L.P.F.
Q2403
IC2405
4dB/−2dB
GAIN CONT.
Q2402 (1/2)
BUFFER
H.P.F.
2MHz
2
3
+
0V REF.
INV. CLIP
43
IC2401
ANALOG IC
GAIN CONT.
FROM IC2403-46
TO CU SIG. PROCESS CIRCUIT
①
②
③
H
① Y
② H.P.F. OUT
③ INV. CLIP OUT
ΔX

Fig. I-36

The Y (luminance) signal input from pin 3 of CN2401 is fed to the low-pass filter FL2401 for bandwidth limitation to 2.8 MHz. Then, it is input to the gain control amplifier. At this step, the amplified gain is controlled by the GAIN CONT signal supplied from pin 46 of IC2403. In the normal sequence of operation, the gain value of 4 dB is provided. In a situation where the input level is significantly high (the Ys signal level is approx. three times higher than its normal level), the gain value is switched over to -2 dB. Then, after passing through the buffer Q2402, the Y signal goes to the 2 MHz high-pass filter formed between pins 2 and 3 of IC2401. At this high-pass filter, the edge of subject image is detected.

In the INV clip circuit, the HPF OUT ② signal is inverted per H and its negative side is clipped for the following purpose: When a picture having fine line pattern is taken, the edge parts may be overlapped to cause degradation in detectability. To reduce this adverse effect, the part of edge signal is cut off.

The differential waveform signal ③ of subject image thus attained has the following characteristic.

1) The edge width X is narrowed as the image is brought closer to true focus.
2) The edge width X in true-focus state is kept constant independently of the contrast of subject image.

The edge width X of differential waveform signal ③ is calculated by the following division circuit to obtain an ES value.

(2) Division circuit

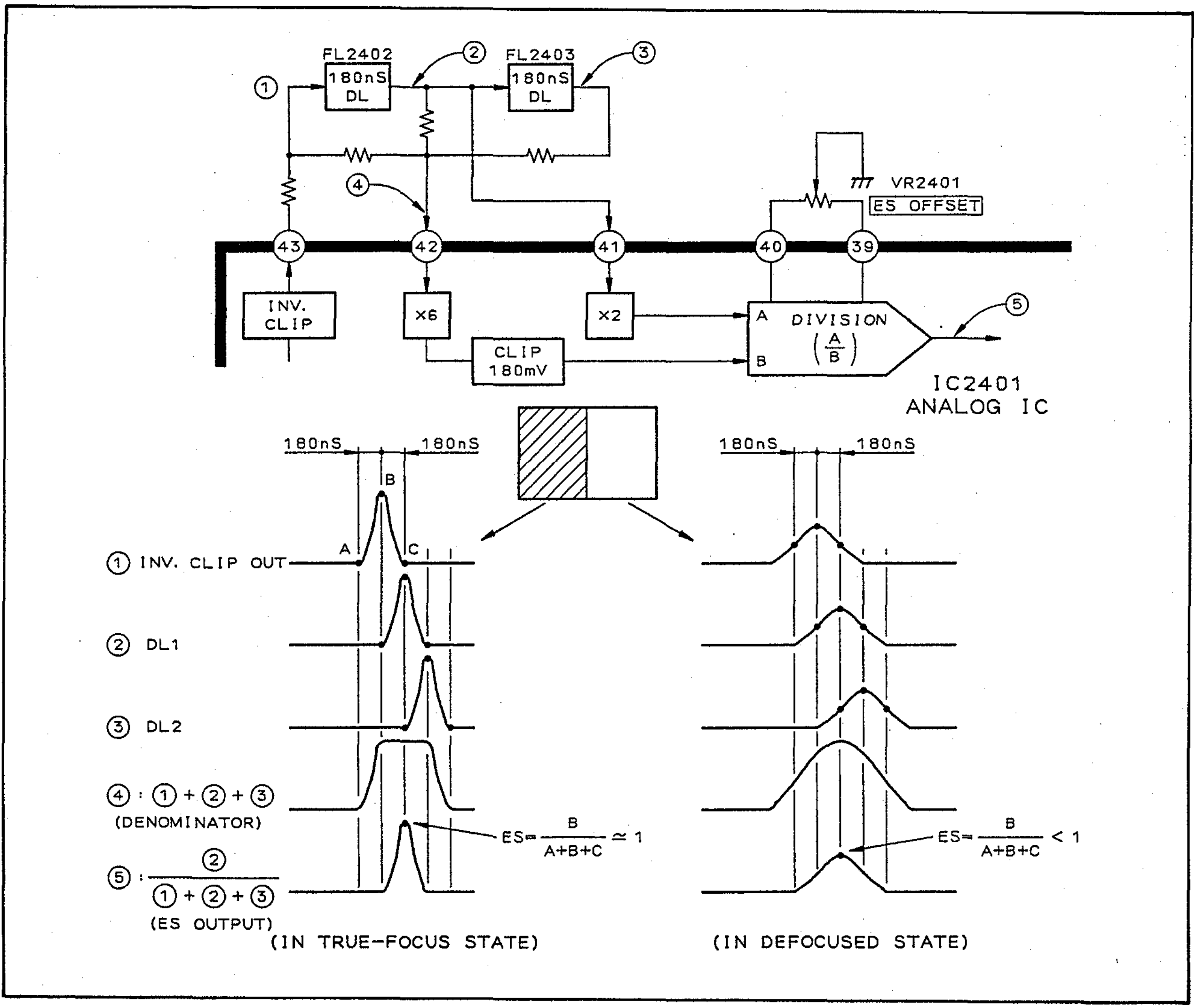

FL2402
180nS DL
FL2403
180nS DL
①
②
③
④
⑤
VR2401
ES OFFSET
43
42
41
40
39
INV. CLIP
×6
×2
CLIP 180mV
A
B
DIVISION (A/B)
IC2401
ANALOG IC
180nS
180nS
A
B
C
① INV. CLIP OUT
② DL1
③ DL2
④ : ①+②+③
(DENOMINATOR)
⑤ : ② / ①+②+③
(ES OUTPUT)
ES= B/(A+B+C) ≃ 1
ES= B/(A+B+C) < 1
(IN TRUE-FOCUS STATE)
(IN DEFOCUSED STATE)

Fig. I-37

The differential waveform signal ① output from pin 43 of IC2401 is fed to the two delay line circuits 180 ns DL ② and 360 ns DL ③. The signals ①, ② and ③ are mixed and applied from pin 42 of IC2401 as a demonitor input to the division circuit ④. As a numerator input, the signal ② appearing at pin 41 is used. The 6x and 2x amplifiers in the IC are equipped for input gain adjustment, and the reliability of ES value is ensured using the 180 mV clip signal on the denominator side.

The division circuit operation is carried out as shown in Fig. I-37. In the true-focus state, the ES output has a value of '1'. In the defocused state, it becomes less than '1'. This can be seen from the following expressions.

Assuming that 'A', 'B' and 'C' of waveform signal ① are assigned as indicated below:

In the true-focus state, A=0, B=1, and C=0;
then,
$B/(A+B+C) = 1/1 = 1$

In the defocused state, A=0.2, B=0.4, and C=0.2;
then,
$B/(A+B+C) = 0.4/0.8 = 0.5$

(3) Peak-hold and sample-hold circuits

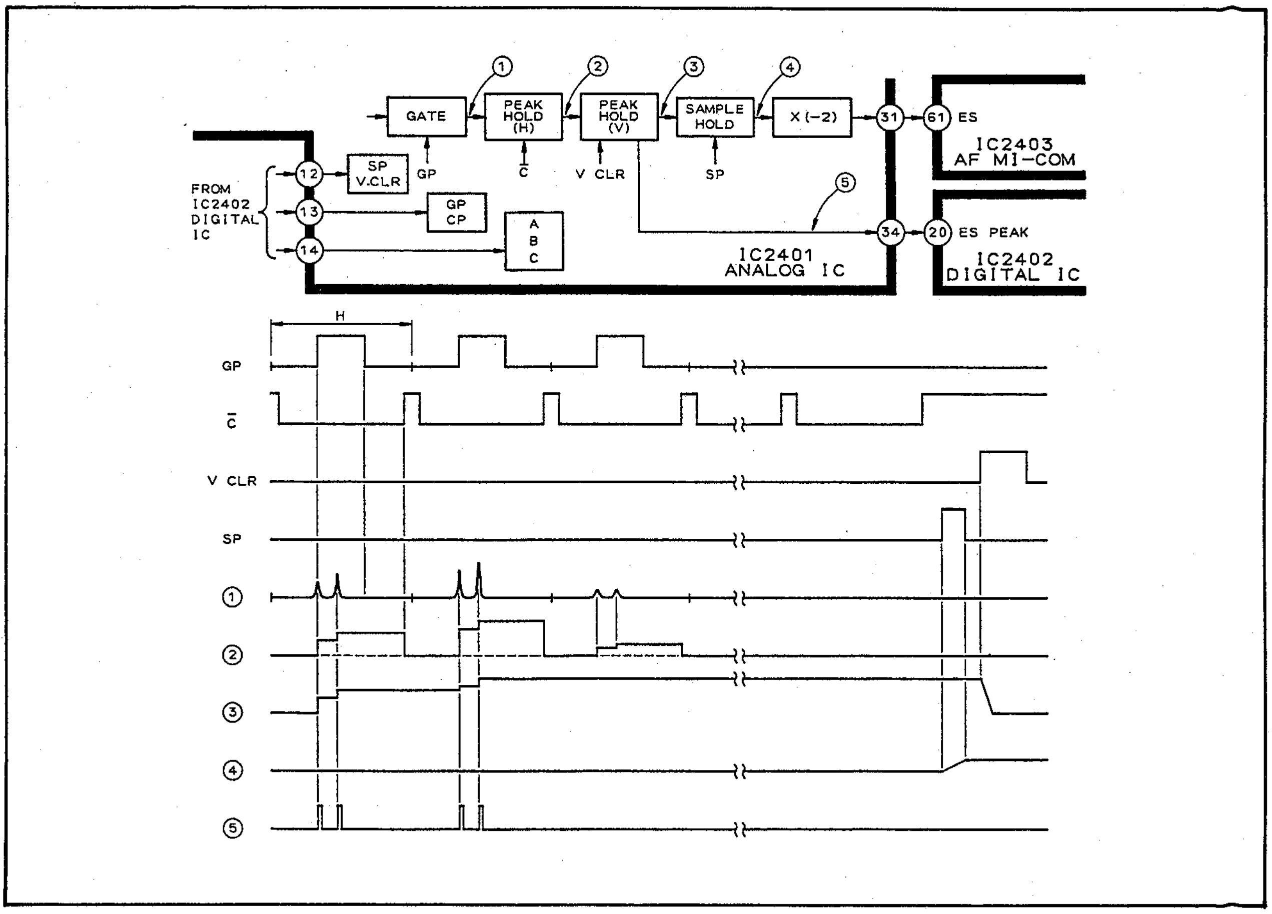

①
②
③
④
⑤
GATE
PEAK HOLD (H)
PEAK HOLD (V)
SAMPLE HOLD
X (−2)
SP V.CLR
GP
C̄
V CLR
SP
GP CP
A B C
FROM IC2402 DIGITAL IC
12
13
14
31
34
61
20
ES
IC2403 AF MI-COM
ES PEAK
IC2402 DIGITAL IC
IC2401 ANALOG IC
H
GP
C̄
V CLR
SP
①
②
③
④
⑤

Fig. I-38

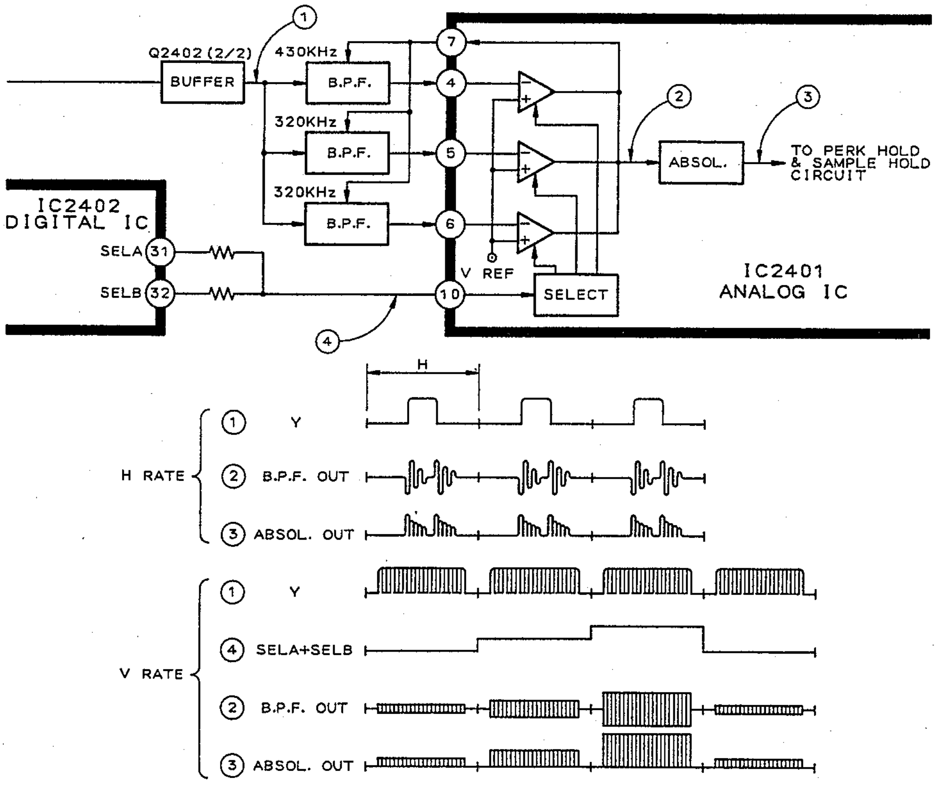
In this circuit, the two-valued and three-valued pulses input from pins 12, 13 and 14 of IC2401 are subjected to level separation to produce various pulse signals. With these pulse signals, the ES output is delivered from the division circuit. The ES output is then goes through the peak-hold and sample-hold circuits, and it is fed as a DC value of ES to the AF microcomputer (IC2403-61). This ES value is updated per V by the sample-hold circuit.

At the gate circuit, only the ES output is allowed to pass through it by the GP pulse corresponding to the AF rangefinding area. This output ① is subjected to peak-holding for H interval with the PEAK HOLD (H) signal, and cleared for H blanking interval with the gate pulse (C). Then, since the output ② is subjected to peak-holding for V interval with the PEAK HOLD (V) signal (output ③), the output ③ bears the highest ES vlaue generated during V interval. The peak of this ES value is sampled and held for V blanking interval with the SAMPLE HOLD period, and then it is output from pin 31 through the -2x amplifier. Therefore, the ES value appearing at pin 31 corresponds to a DC voltage value updated per V. In the actual circuit operation, the voltage value decreases as the subject image is brought closer to true focus.

The ES PEAK signal is output from pin 34 of IC2401 each time the value of PEAK HOLD (V) signal is updated. It is used for the digital IC (IC2402) to determine a peak position of ES value during V interval. In IC2402, the peak position of ES value is detected using the address of the final ES PEAK output pulse in each field. thus, the center of rangefinding area is maintained in auto-tracking focusing control. (Refer to 2-1-2)

3-1-3 CU signal flow

(1) Input circuit



Q2402 (2/2)
BUFFER
430KHz
320KHz
320KHz
B.P.F.
B.P.F.
B.P.F.
IC2402
DIGITAL IC
SELA
SELB
31
32
7
4
5
6
10
V REF
SELECT
ABSOL.
TO PERK HOLD & SAMPLE HOLD CIRCUIT
IC2401
ANALOG IC
①
②
③
④
H
H RATE
① Y
② B.P.F. OUT
③ ABSOL. OUT
V RATE
① Y
④ SELA+SELB
② B.P.F. OUT
③ ABSOL. OUT

Fig. I-39

The Y signal input passes through the Q2402 buffer, and then for low-band edge detection, it is applied to the three band-pass filters (with different gains) formed across pins 4, 5, 6 and 7 of IC2401. As shown in Fig. I-35, if the subject image is out of focus significantly, the ES signal is not output. Therefore, the Y signal is routed through the low-pass filters to make variations in the low-band edge part clearer. If the subject image is defocused significnatly, the equivalent signal to ES signal (with emphasis on low frequency) is required since only the low frequency components are available. This signal is referred to as the CU (climb up) signal.

The low-pass filters formed across pins 4, 5 and 6 of IC2401 have gain values of 7.5x, 15x, 29.5x, respectively. The selection of low-pass filter is conducted with the SELA+SELB signal input form pin 10. This selection is sequenced on a 3 V basis. Therefore, with respect to V rate, the level of low-pass filter output ② varies per 3 V in synchronism with the SELA+SELB signal. Then, at the ABSOL block, the absolute value output ③ with its negative side inverted is generated and supplied to the succeeding peak-hold and sample-hold circuits.

(2) Peak-hold and sample-hold circuits

The CU signal generated through the said seuquence undergoes peak-holding and sample-holding by the circuit equivalent to that used for ES signal. For the circuit operation, refer to P. I-45. A difference between the ES value output from pin 31 of IC2401 and the CU value output from pin 30 is as mentioned below. The ES value contains only 15 Hz frequency component applied by piezoelectric drive operation, whereas the CU value contains 3 V-interval frequency component given in low-pass filter gain changeover as well as 15 Hz frequency component.

3-1-4 YS signal flow

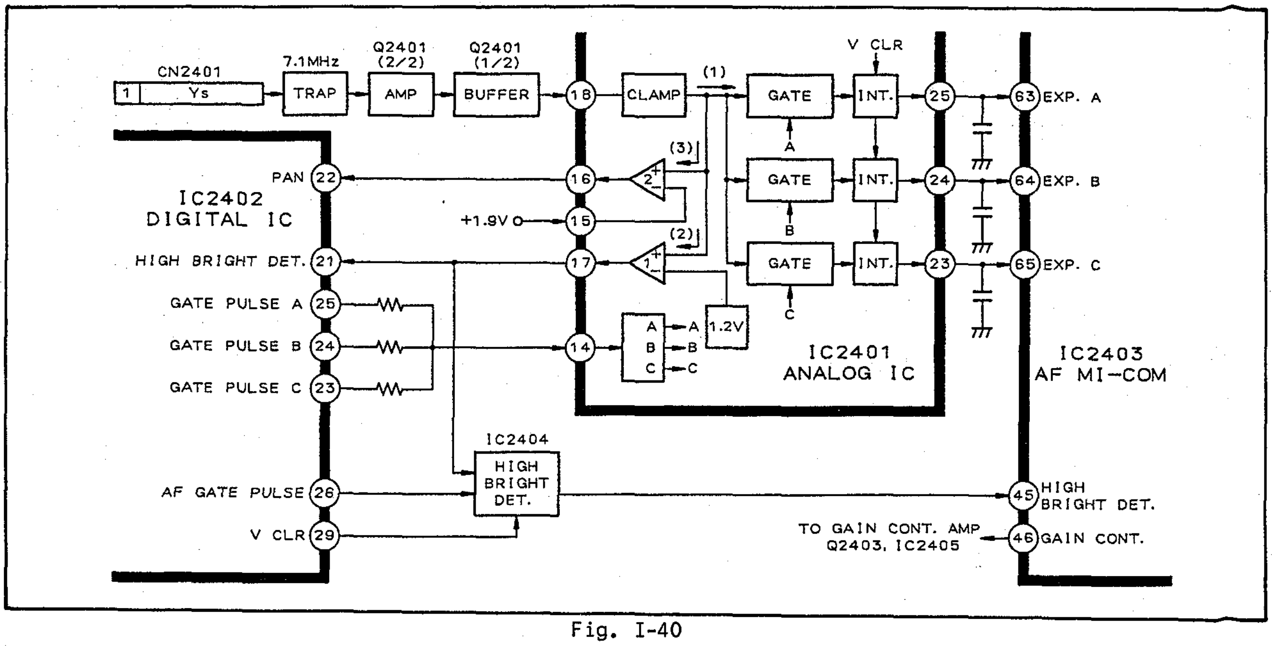

CN2401
1
Ys
7.1MHz
TRAP
Q2401 (2/2)
AMP
Q2401 (1/2)
BUFFER
18
CLAMP
(1)
V CLR
GATE
INT.
25
63
EXP. A
A
(3)
PAN
22
16
2
GATE
INT.
24
64
EXP. B
IC2402
DIGITAL IC
+1.9V
15
B
(2)
HIGH BRIGHT DET.
21
17
1
GATE
INT.
23
65
EXP. C
C
GATE PULSE A
25
GATE PULSE B
24
GATE PULSE C
23
14
A
B
C
1.2V
IC2401
ANALOG IC
IC2403
AF MI-COM
IC2404
HIGH BRIGHT DET.
AF GATE PULSE
26
45
HIGH BRIGHT DET.
V CLR
29
TO GAIN CONT. AMP Q2403, IC2405
46
GAIN CONT.

Fig. I-40

The YS signal input from pin 1 of CN2401 gets rid of 7.1 MHz component, which is used in the CDS circuit, and then goes to pin 18 of IC2401. After clamped in this IC, the YS signal is branched into the three routes where respective signal processings are carried out as described below.

(1) Auto back-light compensation processing

Only the YS signals corrsponding to the auto BLC exposure metering gates A, B and C are taken out through gating operation. Then, each of these YS signals is integrated for 1 V itnerval and furnished to pins 63, 64 and 65 of IC2403. In the AF microcomputer (IC2403), a luminance average value for the exposure metering gates A, B and C is determined using the integral output signal to carry out the auto back-light compensation (refer to 2-1-3). When the subject image is counterlighted, the data is sent to the camera microcomputer serially to control the AGC and the iris.

(2) High luminance detection processing

The comparator 1 in IC2401 is used for high luminance detection. Pin 17 in IC2401 remains in the low state when the luminance in scene is normal. When the YS signal having luminance approx. three times higher than the standard level is input, pin 17 delivers the high-state signal. This output signal is supplied directly to pin 21 of IC2402 as the HIGH BRIGHT DET signal. Also, in IC2404, the following processing is carried out for operation of the AF microcomputer (IC2403, pin 45). In IC2404, the high-state output signal is delivered only when the HIGH BRIGHT DET signal goes high within the AF rangefinding zone (AF gate pulse range). This high-state output signal is held until the V CLR pulse is output during V blanking interval. In the AF microcomputer, high luminance condition is recognized when the signal input to pin 25 goes high. Then, the GAIN CONT signal at pin 46 is turned ot the high state to decrease a gain value of the gain control amplifier at the input part. (See Fig. I-36)

(3) PAN signal generation processing

The YS signal is converted into binary form at a certain level by the comparator 2 in IC2401. The resultant binary signal is supplied to pin 22 of IC2402 as the PAN signal. Using this signal, IC2402 determines whether the camcorder is in the stationary state or panning state, and the motor speed is controlled accordingly.

3-1-5 Piezoelectric drive circuit

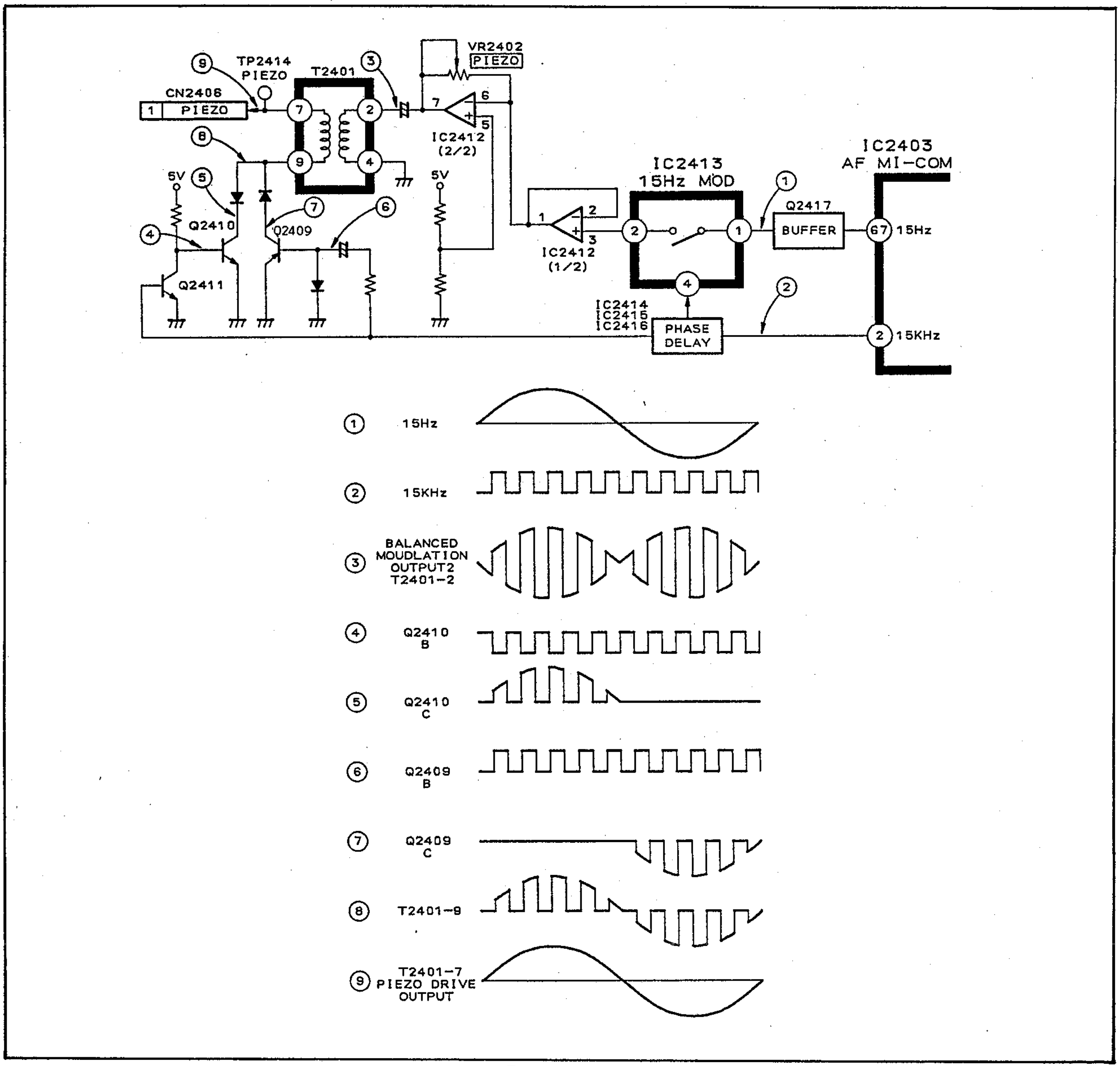

TP2414
PIEZO
T2401
VR2402
PIEZO
CN2406
1 PIEZO
IC2412 (2/2)
5V
Q2410
Q2409
Q2411
IC2413
15Hz MOD
IC2403
AF MI-COM
Q2417
BUFFER
67 15Hz
2 15KHz
IC2412 (1/2)
IC2414
IC2415
IC2416
PHASE DELAY
① 15Hz
② 15KHz
③ BALANCED MOUDLATION OUTPUT2 T2401-2
④ Q2410 B
⑤ Q2410 C
⑥ Q2409 B
⑦ Q2409 C
⑧ T2401-9
⑨ T2401-7 PIEZO DRIVE OUTPUT

Fig. I-41

The 15 Hz signal ① output from pin 67 of IC2403 is switched with the 15 kHz signal ② supplied from IC2413. Thereby, the 15 Hz balanced modulation signal ③ is applied to the primary side (pin 2) of T2401.

Before demodulating the balanced modulation output signal applied to the primary side, Q2410 and Q2409 connected with the secondary side (pin 9) of T2401 is subjected to 15 kHz switching. Thus, the demodulated, stepped-up 15 Hz piezoelectric drive output signal ⑨ is delivered from the secondary side (pin 7) of T2401.

The balanced modulation mentioned above is performed for the purpose of increasing the step-up efficiency of T2401; therefore, conversion into 15 kHz signal is carried out in the above sequence.

3-1-6 Pin functions of DIGITAL IC (IC2402)

Table I-2 (1/2)

<table>
<tr><th>Pin No.</th><th>Signal designation</th><th>I/O</th><th>Function</th></tr>
<tr><td>1
8</td><td>AD7
≀
AD0</td><td>I/O</td><td>Parallel communication bus connected with the AF microcomputer.</td></tr>
<tr><td>9</td><td>ADDRESS READ</td><td>I</td><td>Input terminal for internally latching the address signals input to pins 1 to 8.</td></tr>
<tr><td>10</td><td>DATA WRITE</td><td>I</td><td>Input terminal for internally latching the data signals input to pins 1 to 8.
The data is written on the rise of L pulse.</td></tr>
<tr><td>11</td><td>DATA READ</td><td>I</td><td>Input terminal used for reading out the data signals from pins 1 to 8.
The data is read on the rise of L pulse.</td></tr>
<tr><td>12
18</td><td>NC</td><td>-</td><td>Open.</td></tr>
<tr><td>19</td><td>CU PEAK</td><td>I</td><td>Peak position signal input terminal for CU value. When the pulse is applied to the CU PEAK terminal under condition that the subject image is located in the AF area, the current address is stored into memory.</td></tr>
<tr><td>20</td><td>ES PEAK</td><td>I</td><td>Peak position signal input terminal for ES value. When the pulse is applied to the ES PEAK terminal under condition that the subject image is located in the AF area, the current address is stored into memory.</td></tr>
<tr><td>21</td><td>HIGH BRIGHT DET</td><td>I</td><td>High luminance detection signal input terminal. The high state of this signal indicates high luminance.</td></tr>
<tr><td>22</td><td>PAN</td><td>I</td><td>PAN signal input terminal.
According to the change of PAN signal on the entire screen, it is judged whether the camcorder is in the stationary state or panning state. In the stationary state, the motor speed is regulated to prevent AF hunting.</td></tr>
<tr><td>23</td><td>GATE PULSE C</td><td>O</td><td rowspan="3">Used to perform gating for auto BLC exposure metering area (A, B, C).</td></tr>
<tr><td>24</td><td>GATE PULSE B</td><td>O</td></tr>
<tr><td>25</td><td>GATE PULSE A</td><td>O</td></tr>
<tr><td>26</td><td>AF GATE PULSE</td><td>O</td><td>Used to perform gating for AF rangefinding area.</td></tr>
<tr><td>27</td><td>NC</td><td>-</td><td>Open.</td></tr>
<tr><td>28</td><td>VDD</td><td>I</td><td>Connected with CAMERA 5V.</td></tr>
<tr><td>29</td><td>V CLR</td><td>O</td><td>V clear signal.
The high-state pulse is output during V blanking interval.</td></tr>
<tr><td>30</td><td>SP</td><td>O</td><td>Sampling pulse.
The low-state pulse is output during V blanking interval.</td></tr>
<tr><td>31
32</td><td>SELA
SELB</td><td>O</td><td>Gain select signal for the band-pass filter at CU signal input part.
The high-state pulse is output per 3V.
<table>
<tr><th>BPF
Signal</th><th>7.5 times</th><th>15 times</th><th>29.5 times</th></tr>
<tr><td>SELA</td><td>0</td><td>0</td><td>1</td></tr>
<tr><td>SELB</td><td>0</td><td>1</td><td>0</td></tr>
</table>
* Note that the SELA and SELB signals have different phases.</td></tr>
<tr><td>33
34
35</td><td>NC</td><td>-</td><td>Open</td></tr>
</table>

Table I-2 (2/2)

Pin No.	Signal designation	I/O	Function
36	NTSC Ⓗ/PAL Ⓛ	I	NTSC-PAL select input terminal. The high state indicates NTSC scheme, and the low state represent PAL state.
37	HD	I	Horizontal sync signal input terminal.
38	NC	-	Open.
39	CLOCK	I	Clock signal input terminal.
40	-	-	Connected with ground.
41	VD	I	Vertical sync signal input terminal.
42	GND	-	Connected with ground.
43	AF FLAME	O	Display signal for AF area.
44	INTERRUPT	O	Interrupt signal output terminal used for parallel communication with the microcomputer.

3-1-7 Pin function of AF microcomputer (IC2403)

Table I-3 (1/3)

Pin No.	Signal designation	I/O	Function
1	NC	-	Open.
2	15 KHz	O	For preparing Piezo drive pulse. 15 KHz pulse output terminal.
3	NC	-	Open.
4 ≀ 11	AD7 ≀ AD0	I/O	Bus for parallel communication with digital IC. Address and data are multiplexed.
12	DATA WRITE	O	This is the output pin for writing the data output from pins 4 through 11 into digital IC. Data is written in at the rise time of "L" pulse.
13	DATA READ	O	This is the output pin for reading out data from pins 1 through 8 of digital IC. Data is read at the rise time of "L" pulse.
14	ADDRESS READ	O	This is the output pin to read the address output from pins 4 through 11 into digital IC. Reads the address at the rise time of "H" pulse, and holds at the fall time.
15	AF FRAME ON Ⓗ	O	Controls the display of autofocus area. Indicates "H".
16	NC	-	Open.
17	AF CS	I	Chip selection for serial data communication with camera microcomputer (IC2205). Communicates within "H" period.
18	STB	I	Serial communication offering input pin (for plant adjustment).
19	INTERRUPT	I	Parallel interrupting input pin with digital IC (IC2402).

Table I-3 (2/3)

<table>
<tr><th>Pin No.</th><th>Signal designation</th><th>I/O</th><th>Function</th></tr>
<tr><td>20
≀
24</td><td>NC</td><td>-</td><td>Open.</td></tr>
<tr><td>25</td><td>GND</td><td>-</td><td>Connected with GND.</td></tr>
<tr><td>26</td><td>RESET Ⓛ</td><td>I</td><td>Reset input pin. Reset with "L".</td></tr>
<tr><td>27</td><td>NC</td><td>-</td><td>Open.</td></tr>
<tr><td>28</td><td>X IN</td><td>I</td><td>10 MHz X'TAL connection pin.</td></tr>
<tr><td>29</td><td>X OUT</td><td>O</td><td></td></tr>
<tr><td>30
≀
34</td><td>GND</td><td>-</td><td>Connected with GND.</td></tr>
<tr><td>35</td><td>DATA SW</td><td>I</td><td>For plant adjustment.</td></tr>
<tr><td>36
≀
40</td><td>GND</td><td>-</td><td>Connected with GND.</td></tr>
<tr><td>41</td><td>NC</td><td>-</td><td>Open.</td></tr>
<tr><td>42</td><td>TELE Ⓗ</td><td>O</td><td>PZ motor teleside drive signal.</td></tr>
<tr><td>43</td><td>WIDE Ⓗ</td><td>O</td><td>PZ motor wideside drive signal.</td></tr>
<tr><td>44</td><td>AE RESET</td><td>O</td><td>AE reset output signal.
Output "H" pulse at power supply time, and then by making YS signal line +1.8V, offset BLC circuit.</td></tr>
<tr><td>45</td><td>HIGH BRIGHT DET</td><td>I</td><td>This is the input pin of high bright detecting signal.
When high brightness is detected with "H", pin 46 is turned "H".</td></tr>
<tr><td>46</td><td>GAIN CONT.</td><td>O</td><td>This is the gain switch control signal of Y signal input amplifier.
Amplified gain is 4 dB at normal "L", and -2 dB at bright time "H".</td></tr>
<tr><td>47</td><td>NC</td><td>-</td><td>Open.</td></tr>
<tr><td>48</td><td>AF FAR</td><td>O</td><td>AF motor infinity side drive signal. PWM output signal.</td></tr>
<tr><td>49</td><td>AF NEAR</td><td>O</td><td>AF motor closest side drive signal. PWM output signal.</td></tr>
<tr><td>50
51</td><td>NC</td><td>-</td><td>Open.</td></tr>
<tr><td>52</td><td>LED CONT.</td><td>O</td><td>This is LED control signal of photoreflector for focus and zoom position detection. (H → LED ON, L → LED OFF)</td></tr>
<tr><td>53
54</td><td>FOCUS 0
FOCUS 1</td><td>I</td><td>This is signal input pin of photoreflector for focus position detection.
<table>
<tr><th>Zone / Signal</th><th>0.6 m</th><th>0.6 m ∿ 1.1 m</th><th>1.1 m ∿ ∞</th><th>∞</th></tr>
<tr><td>FOCUS 0</td><td>L</td><td>L</td><td>H</td><td>H</td></tr>
<tr><td>FOCUS 1</td><td>L</td><td>H</td><td>H</td><td>L</td></tr>
</table></td></tr>
<tr><td>55
56
57</td><td>ZOOM 2
ZOOM 1
ZOOM 0</td><td>I</td><td>Signal input pin of photoreflector for zoom position detection.
<table>
<tr><th>Zone / Signal</th><th>8 mm ≀ 14 mm</th><th>14 mm ≀ 20 mm</th><th>20 mm ≀ 28 mm</th><th>28 mm ≀ 40 mm</th><th>40 mm ≀ 58 mm</th><th>58 mm ≀ 80 mm</th></tr>
<tr><td>ZOOM 0</td><td>L</td><td>H</td><td>H</td><td>L</td><td>L</td><td>L</td></tr>
<tr><td>ZOOM 1</td><td>L</td><td>L</td><td>H</td><td>H</td><td>H</td><td>L</td></tr>
<tr><td>ZOOM 2</td><td>L</td><td>L</td><td>L</td><td>L</td><td>H</td><td>H</td></tr>
</table></td></tr>
</table>

Table I-3 (3/3)

Pin No.	Signal designation	I/O	Function
58 59	ZOOM SW 1 ZOOM SW 2	I	Input pin of variable speed zoom SW. Zoom SW 1 → zoom button signal on front side. ZOOM SW 2 → zoom lever signal on rear side. (WIDE) STOP (TELE) ↓ 3.6V ←→ 0V 1.8V
60	IRIS POSITION	I	Signal input pin for iris position detection. Open time: 2.8V, Close time: 0.8V.
61	ES	I	Input pin of ES value.
62	CU	I	Input pin of CU value.
63	EXP. A	I	Input pin of value A for auto BLC.
64	EXP. B	I	Input pin of value B for auto BLC.
65	EXP. C	I	Input pin of value C for auto BLC.
66	SPEED REF.	O	Standard voltage of PZ motor speed. (7 sec.) (12 sec.) 2.7V ←→ 4.1V
67	15 Hz	O	15 Hz Piezo drive pulse output pin.
68	DA VREF	I	These are input pin of standard 3.6V.
69	AD VREF	I	
70	GND	-	Connected with GND.
71	VCC	I	Connected with camera 5V.
72	VCC	I	
73	GND	-	Connected with GND.
74	FSRDY	O	For plant adjustment.
75	S-CLOCK	O	Clock output for communication of serial data between camera microcomputer (IC2205).
76	S-DATA OUT	O	Data output for communication of serial data between camera microcomputer (IC2205).
77	S-DATA IN	I	Data input for communication of serial data between camera microcomputer (IC2205).
78	NC	-	Open.
79	NTSC Ⓗ/PAL Ⓛ	I	This is input pin of NTSC/PAL switch. (NTSC → H, PAL → L)
80	NC	-	Open.

3-1-8 Parallel communication

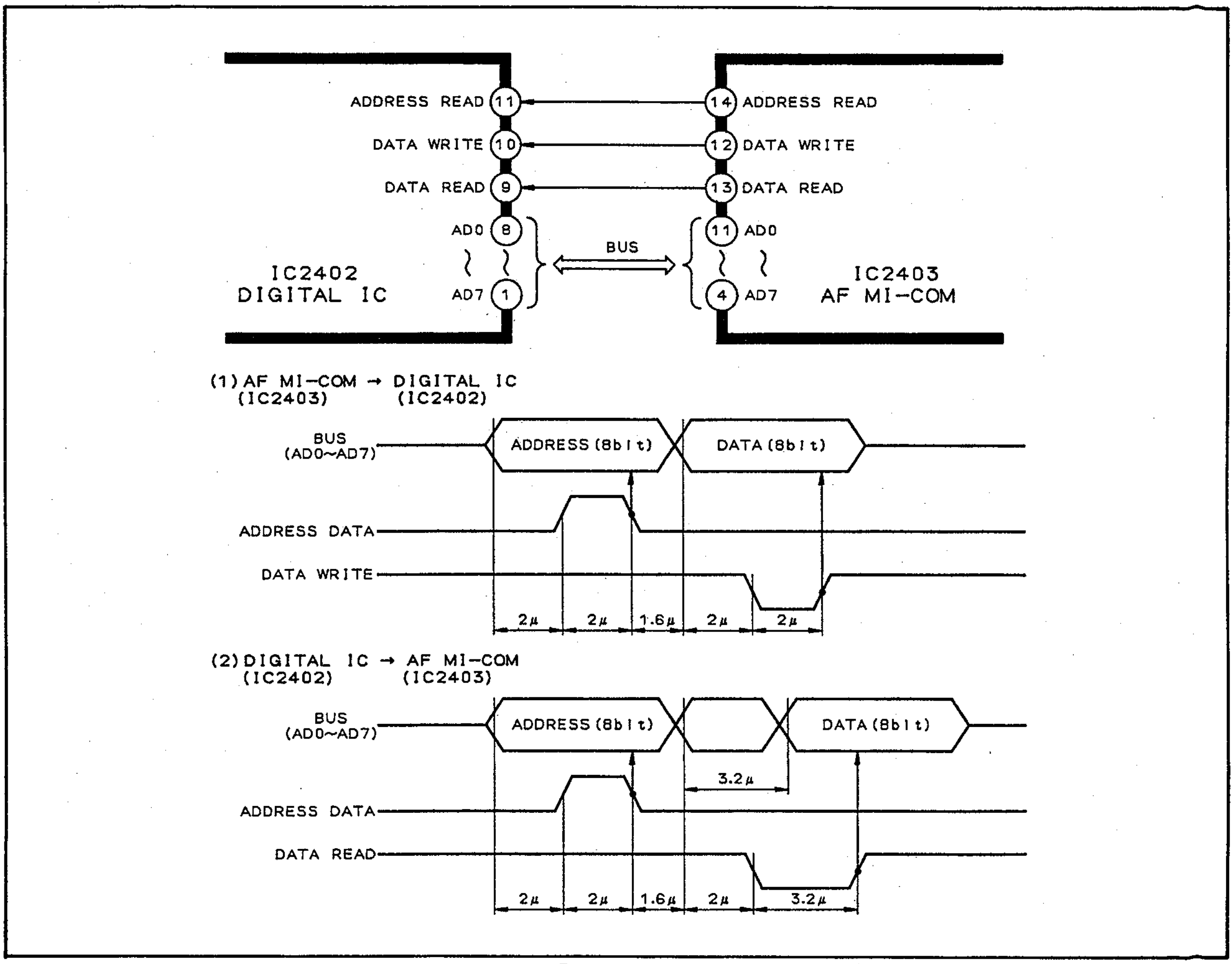

ADDRESS READ
DATA WRITE
DATA READ
AD0
AD7
IC2402
DIGITAL IC
11
10
9
8
1
BUS
14
12
13
11
4
ADDRESS READ
DATA WRITE
DATA READ
AD0
AD7
IC2403
AF MI-COM
(1)AF MI-COM → DIGITAL IC
(IC2403) (IC2402)
BUS
(AD0~AD7)
ADDRESS (8bit)
DATA (8bit)
ADDRESS DATA
DATA WRITE
2μ
2μ
1.6μ
2μ
2μ
(2)DIGITAL IC → AF MI-COM
(IC2402) (IC2403)
BUS
(AD0~AD7)
ADDRESS (8bit)
DATA (8bit)
3.2μ
ADDRESS DATA
DATA READ
2μ
2μ
1.6μ
2μ
3.2μ

Fig. I-42

Parallel communication is implemented between the AF microcomputer (IC2403) and DIGITAL IC (IC2402). The communication bus comprises a total of eight lines AD0 to AD7. In communication, the address and data signals are multiplexed. Eight addresses 00 to 07 are assigned for read/ write operation. The communication timing is provided under full control of the AF microcomputer.

(1) Data transfer from AF microcomputer to DIGITAL IC

An address (00 to 07) is determined on the fall of the ADDRESS READ signal, and data is written into the DIGITAL IC on the rise of the DATA WRITE signal. The AF area data and auto-BLC area-A/B/C data are transferred in this communication sequence.

(2) Data transfer from DIGITAL IC to AF microcomputer

In the same fashion as mentioned above, an address (00 to 07) is determined on the fall of the ADDRESS READ signal. Then, for changing the input mode of DIGITAL IC to the output mode the upper four bits of address are set to '0000' and the DATA READ terminal is set to 'L'. Thereby, the DIGITAL IC is put in the output mode, and the data signals output from pins 8 to 1 are read by the AF microcomputer on the rise of the DATA READ signal. The PAN signal data, ES/CU peak position signal data, etc. are transfered in this communication sequence.

3-2 Camera circuit operation

3-2-1 Power supply circuit

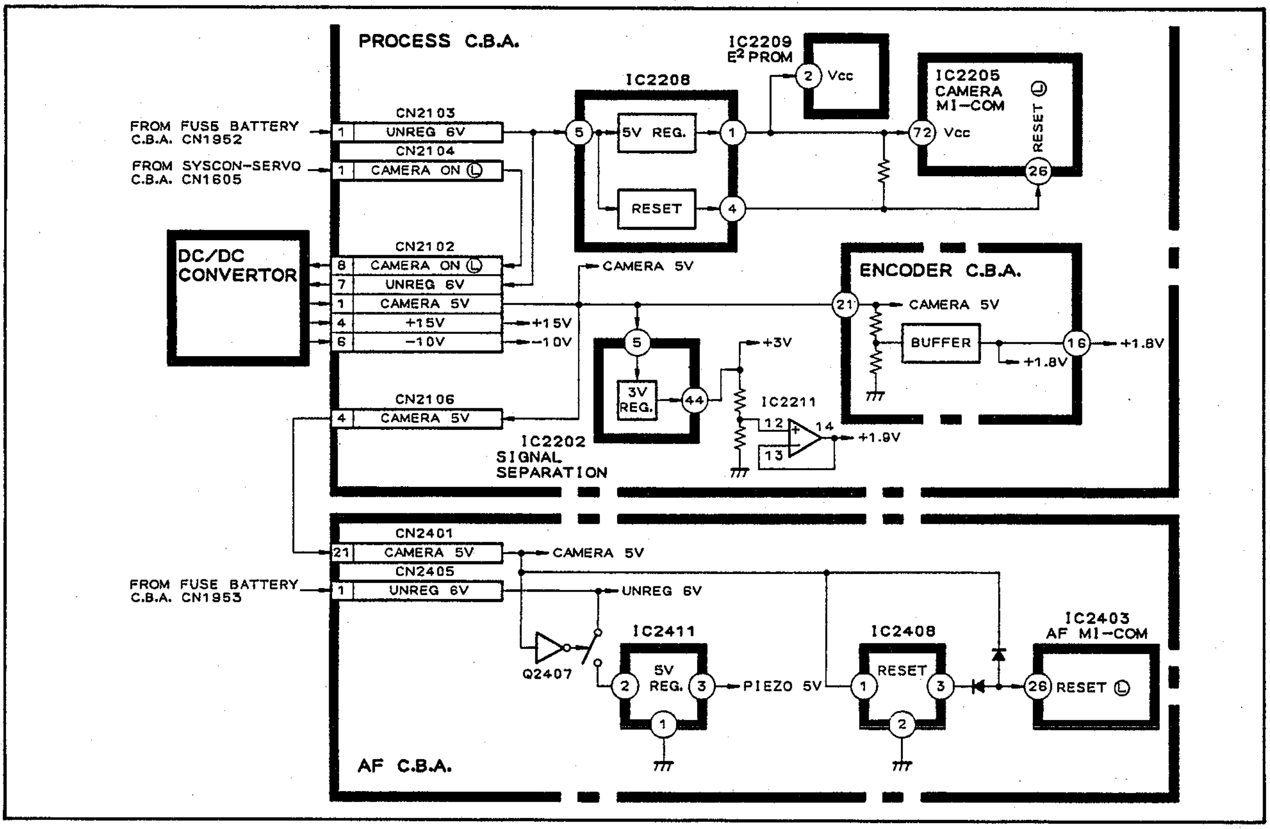

PROCESS C.B.A.
IC2209
E² PROM
Vcc
IC2208
5V REG.
RESET
IC2205
CAMERA
MI-COM
Vcc
RESET Ⓛ
FROM FUSE BATTERY C.B.A. CN1952
FROM SYSCON-SERVO C.B.A. CN1605
CN2103
UNREG 6V
CN2104
CAMERA ON Ⓛ
DC/DC CONVERTOR
CN2102
CAMERA ON Ⓛ
UNREG 6V
CAMERA 5V
+15V
-10V
+15V
-10V
CAMERA 5V
3V REG.
+3V
IC2211
+1.9V
ENCODER C.B.A.
CAMERA 5V
BUFFER
+1.8V
+1.8V
CN2106
CAMERA 5V
IC2202
SIGNAL
SEPARATION
CN2401
CAMERA 5V
CAMERA 5V
CN2405
UNREG 6V
UNREG 6V
FROM FUSE BATTERY C.B.A. CN1953
Q2407
IC2411
5V REG.
PIEZO 5V
IC2408
RESET
IC2403
AF MI-COM
RESET Ⓛ
AF C.B.A.

Fig. I-43

(1) Kind of power source:

Power supply of camera is prepared on the basis of UNREG 6V from battery/AC adapter.

° C-EVER 5V
When power supply is connected, power is converted to 5V on the regulator (IC2208) of process C.B.A., and the constant voltage is output as long as power supply is connected.

° Camera 5V (+15V, -10V)
By CAMERA ON Ⓛ from the servo microcomputer pin 54 of IC1601, the DC/DC converter is set ON, and outputs camera 5V and +15V, -10V for CCD drive.

° Standard voltage (+3V, +1.9V, +1.8V)
As standard voltage of each circuit, +3V from camera 5V with IC2202, +1.9V from the +3V with resistance and IC2215, and +1.8V from Camera 5V on encoder circuit are respectively generated.

° Piezo 5V
Using Camera 5V as a trigger, the +5V is output from the IC2411 of AF circuit.

° Reset camera, AF microcomputer
Pin 26 of reset pin is mandatorily reduced to "L" at rise and fall times of power supply, with reset IC of each microcomputer, which is reset at this "L" period.

3-2-2 CCD drive circuit

The CCD imaging device (1/2-inch size, with 470,000 pixels) has been developed newly for Model A1 MARK II. Its drive circuit has also been configured on a new design scheme. Fig. I-44 shows the block diagram of CCD drive circuit.

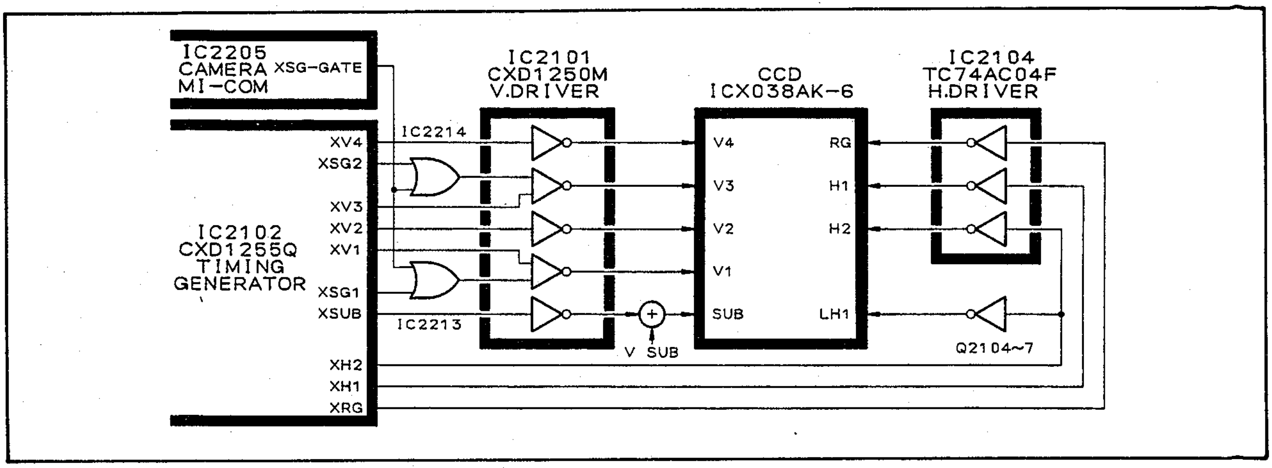

IC2205
CAMERA
MI-COM
XSG-GATE
IC2101
CXD1250M
V.DRIVER
CCD
ICX038AK-6
IC2104
TC74AC04F
H.DRIVER
IC2214
XV4
XSG2
XV3
XV2
XV1
XSG1
XSUB
IC2102
CXD1255Q
TIMING
GENERATOR
IC2213
V4
V3
V2
V1
SUB
RG
H1
H2
LH1
V SUB
Q2104~7
XH2
XH1
XRG

Fig. I-44

(1) V CCD drive circuit

The timing generator IC2102 outputs XV1 to 4 signals, XSG1 and 2 signals, and XSUB signal, each of which has a binary value of 0 V or 5 V. It is therefore necessary to convert these signal for CCD driving operation. This signal conversion is carried out by the V DRIVER circuit IC2101, i.e. the invert driving is performed on each channel. The XV1 to 4 signals, XSG1 and 2 signals, and XSUB signal are converted into the drive pulses indicated in Fig. I-45. With these pulse signals, the CCD pickup is driven. Note that the XSUB signal is used as an electronic shutter control pulse, which is delivered only in the electronic shutter mode and superimposed on the DC voltage of V SUB. In this sequence, the XSUB signal is clamped with +15 V for DC level adjustment. (To the XSG1 and 2, the XSG GATE pulse is added by the IC2213 and IC2214. The detail flow is explained in p. 68.)

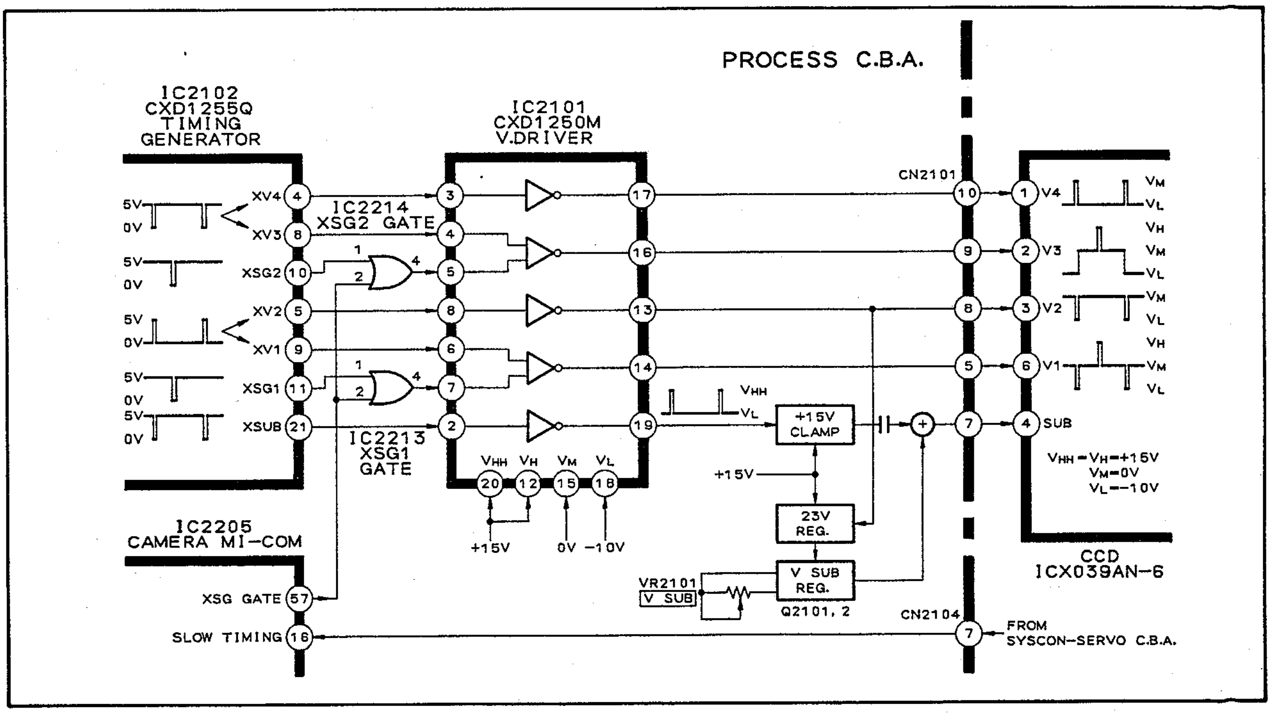

PROCESS C.B.A.
IC2102
CXD1255Q
TIMING
GENERATOR
IC2101
CXD1250M
V.DRIVER
CN2101
5V
0V
XV4 4
XV3 8
XSG2 10
XV2 5
XV1 9
XSG1 11
XSUB 21
IC2214
XSG2 GATE
IC2213
XSG1
GATE
1
2
4
3
4
5
8
6
7
2
17
16
13
14
19
VHH VH VM VL
20 12 15 18
+15V
0V -10V
VHH
VL
+15V
CLAMP
+15V
23V
REG.
V SUB
REG.
Q2101, 2
VR2101
V SUB
CN2104
10
9
8
5
7
1 V4
2 V3
3 V2
6 V1
4 SUB
VM
VL
VH
VHH=VH=+15V
VM=0V
VL=-10V
CCD
ICX039AN-6
IC2205
CAMERA MI-COM
XSG GATE 57
SLOW TIMING 16
7
FROM
SYSCON-SERVO C.B.A.

Fig. I-45

(2) H CCD drive circuit

The XH1 and 2 signals output from IC2101 are inverted by the H DRIVER circuit IC2104 and applied to the CCD. The XRG signal is also inverted by IC2104 and clamped with Vrgl. Then this signal is applied to the CCD.

For H CCD final-stage clocking, the XH1 signal branched to the other path is inverted and clamped with -4 V. As the LH1 signal, it is applied to the CCD.

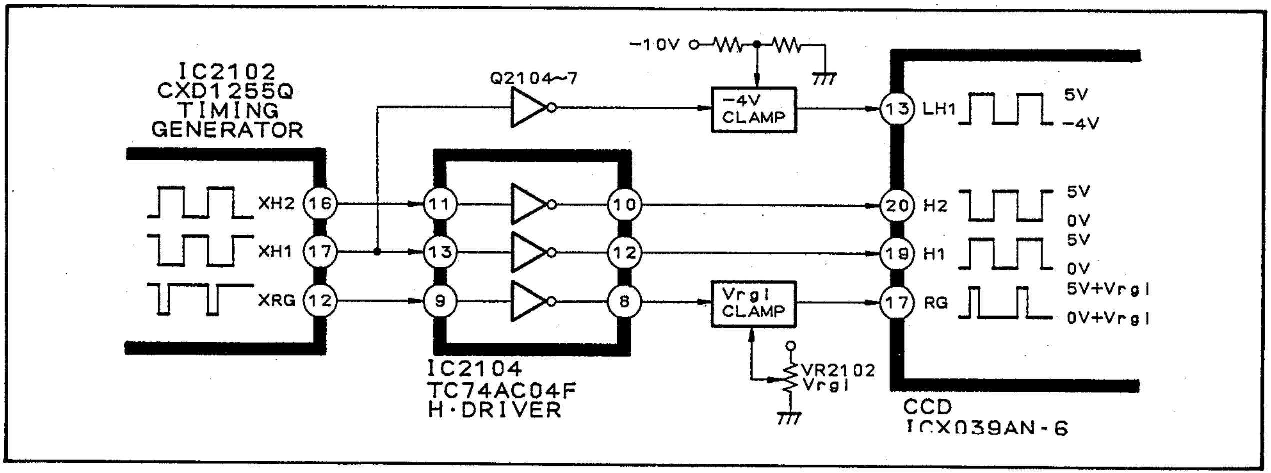

IC2102
CXD1255Q
TIMING
GENERATOR
XH2 16
XH1 17
XRG 12
Q2104~7
−10V
-4V CLAMP
11
13
9
10
12
8
IC2104
TC74AC04F
H·DRIVER
Vrgl CLAMP
VR2102
Vrgl
13 LH1
5V
-4V
20 H2
5V
0V
19 H1
5V
0V
17 RG
5V+Vrgl
0V+Vrgl
CCD
ICX039AN-6

Fig. I-46

3-2-3 Pulse signal generator circuit

The pulse signal generator circuit consists primarily of two ICs; timing generator IC2102 and sync generator IC2103. Oscillation of '1816 fH = 28.375 MHz' is performed at IC2102, and the oscillation signal is subjected to 1/2 frequency division. The clock signal thus produced is supplied to IC2103. At IC2103, this clock signal is internally frequency-divided ot produce respective sync signals. In synchronism with the HD and VD signals output from IC2103, the IC2102 generates such signal processing pulses as CCD drive pulse, S/H pulse, clamp pulse and blanking pulse using 28.375 MHz source oscillation.

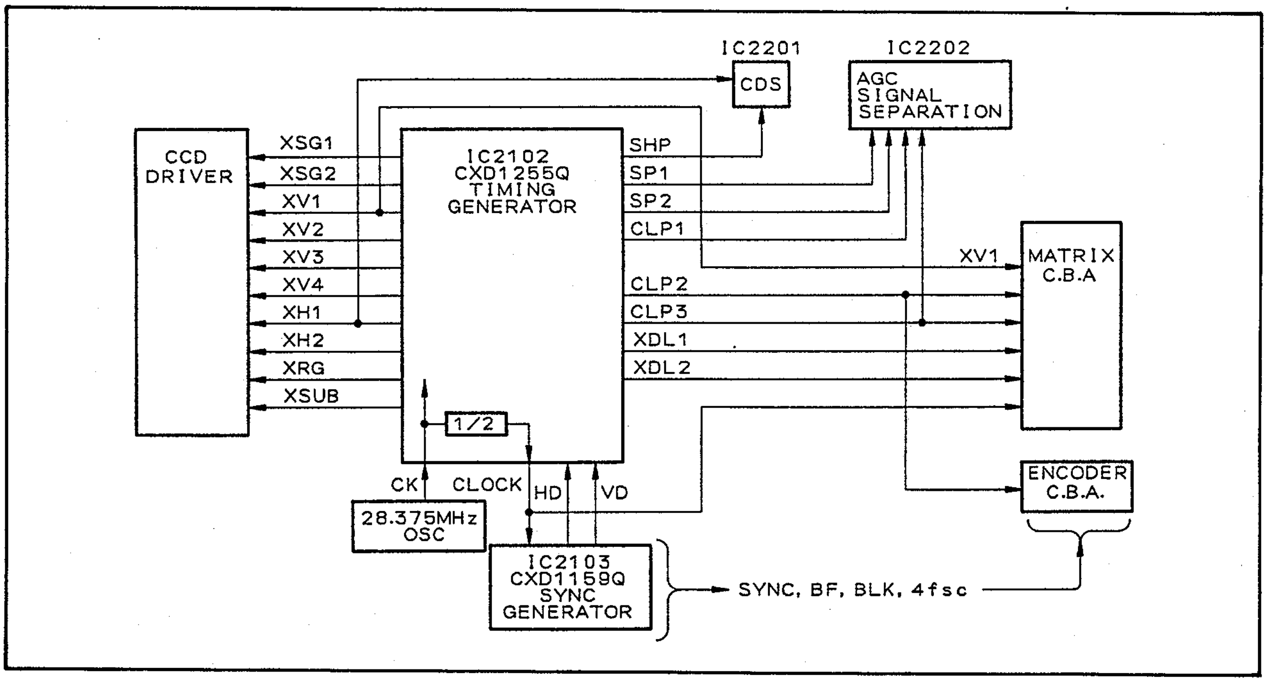
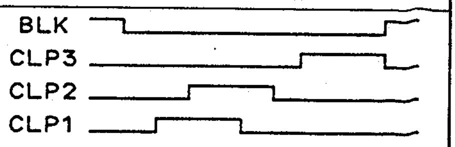

IC2201
CDS
IC2202
AGC
SIGNAL
SEPARATION
CCD
DRIVER
XSG1
XSG2
XV1
XV2
XV3
XV4
XH1
XH2
XRG
XSUB
IC2102
CXD1255Q
TIMING
GENERATOR
SHP
SP1
SP2
CLP1
CLP2
CLP3
XDL1
XDL2
XV1
MATRIX
C.B.A
1/2
CK
CLOCK
HD
VD
28.375MHz
OSC
ENCODER
C.B.A.
IC2103
CXD1159Q
SYNC
GENERATOR
SYNC, BF, BLK, 4fsc

Fig. I-47

(1) Pin functions of IC2102 (timing generator)

Table I-4

Pin No.	Signal designation	I/O	Function
1, 48	SP1, SP2	O	Sample-hold pulse for color separation
2	SHD	O	Sample-hold pulse for CCD data output (NC)
3	SHP	O	Sample-hold pulse for precharge level of CCD output/clamp pulse for CDS
4,5,8,9	XV1 ~ XV4	O	CCD drive pulse, V CCD transfer clock
6,15,31	Vss	I	Connected to ground.
7	TEST	I	Test terminal, connected with +5 V
10,11	XSG1, XSG2	O	Sensor gate 1 and 2 pulses
12	XRG	O	CCD output reset pulse
13	FL1	I	1/120-sec electronic shutter control input *
14	VAA	O	Cleaning pulse for vertical blanking (NC)
16,17	XH1, XH2	O	CCD drive pulse, H CCD transfer clock
18,19,43	Vdd	I	+5 V power terminal
20	MODE 1	I	Selection of electronic shutter control input (SHUTTER 0 to 2) H: Parallel input L: Serial input
21	XSUB	O	Electronic shutter control pulse (charge sweep-out pulse)
22	EN	I	Electronic shutter on/off H: On L: Off
23,24,25	SHUTTER 0 ②	I	Electronic shutter speed select input *
26	PAL Ⓗ (MODE 2)	I	NTSC/PAL selection H: PAL scheme L: NTSC scheme
27,28,37,47	TEST	I	Test terminal (NC)
29	OSC I	I	Inverter input for oscillation
30	OSC 0	O	Inverter output for oscillation
32	CK	I	Inverter circuit signal
33	XCK	O	Clock input for waveform shaping PAL: 28.375 MHz
34	VD	I	Vertical sync signal input
35	HD	I	Horizontal sync signal input
36	CLOCK	O	Clock output for sync generator (IC2103), with half frequency of CK
38	PBLK	O	Preblanking pulse
39	ID	O	Line ID pulse for 2R-G, -(2B-G) line identification
40	CLP3	O	Clamping pulse 
41	CLP2	O	Clamping pulse
42	CLP1	O	Clamping pulse for CCD output optical black
44	XDL2	O	Clock pulse for delay line (7.09 MHz) The phases of XDL1 and XDL2 signals are 180° opposite to each other.
45	XDL1	O	
46	MODE 3	I	PBLK pulse control input H: Wide L: Narrow

* For the relationship between shutter speed and control signal, refer to P. I-72, Table I-6.
NC: Not-connected

(2) IC2103 (sync generator)

Fig. I-48 shows the timing sequence of the signals output from IC2103.

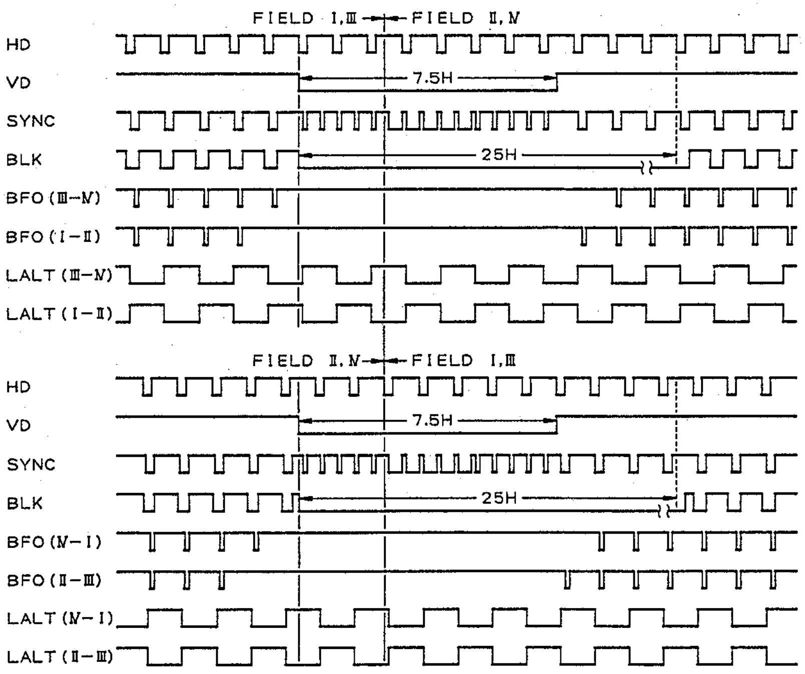


Fig. I-48

3-2-4 CDS (correlation double sampling) circuit

The VO signal is delivered from the CCD as shown in Fig. I-49. The CDS circuit is used for sampling the necessary signal component from VO signal.

The VO signal output from CCD is delivered to the CDS circuit through Q2201. In the CDS circuit, before sampling the VO signal component, the precharge level is clamped with SHP to adjust the black level. Then, only the necessary signal component that is sampled and held with XH1 is sent to IC2202.

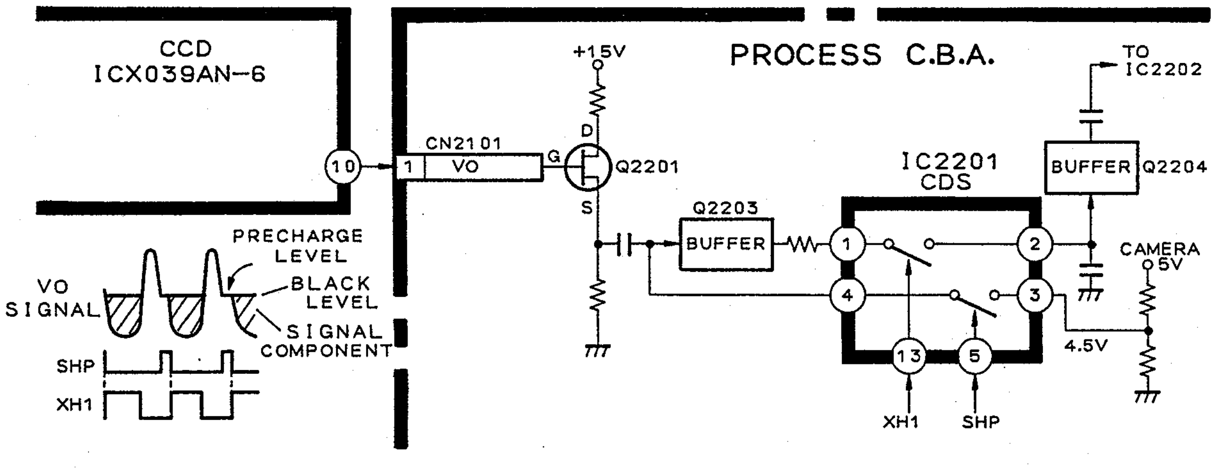

CCD
ICX039AN-6
10
PROCESS C.B.A.
CN2101
1
VO
+15V
D
G
S
Q2201
Q2203
BUFFER
IC2201
CDS
1
2
3
4
13
5
TO IC2202
BUFFER
Q2204
CAMERA 5V
4.5V
XH1
SHP
PRECHARGE LEVEL
BLACK LEVEL
SIGNAL COMPONENT
VO SIGNAL
SHP
XH1

Fig. I-49

3-2-5 Iris control circuit and automatic gain control circuit

The signal output from the CDS circuit is applied to pin 13 of IC2202. Then, after being subjected to OB clamp and automatic gain control, it is output from pin 6. It is applied to pin 4 again, and fed to signal separation circuit.

(1) Automatic gain control circuit

The output signal with the blanking part removed through AGC is delivered from pin 40 of IC2202. The output signal is used for the automatic gain control circuit. For automatic gain control, center-weighted average metering is carried out with the gate pulse B supplied from the AF-KEY C.B.A., and integration (smoothing) is performed through the resistor and capacitor.

Then, the AGC signal, with its level adjusted through VR2202, is input to the camera microcomputer.

Upon receipt of the AGC signal, the camera microcomputer outputs the D/A AGC signal from pin 66 for automatic gain control operation in IC2202. Also, when the manual iris mode is selected, the camera microcomputer fixes the level of AGC signal at that point of time.

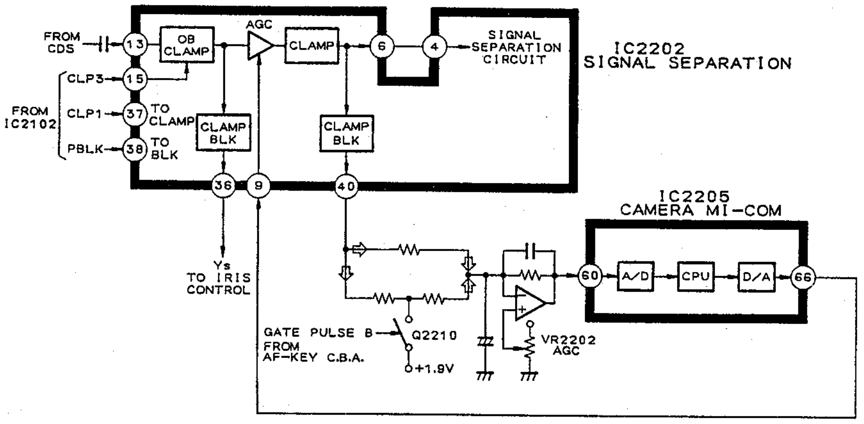

FROM CDS
13
OB CLAMP
AGC
CLAMP
6
4
SIGNAL SEPARATION CIRCUIT
IC2202
SIGNAL SEPARATION
CLP3
15
FROM IC2102
CLP1
37
TO CLAMP
CLAMP BLK
CLAMP BLK
PBLK
38
TO BLK
36
9
40
Ys
TO IRIS CONTROL
IC2205
CAMERA MI-COM
60
A/D
CPU
D/A
66
GATE PULSE B
FROM AF-KEY C.B.A.
Q2210
+1.9V
VR2202
AGC

Fig. I-50

(2) Iris control circuit

For the iris control signal Ys output from pin 36 of IC2202, center-weighted average metering is carried out in the same manner as in automatic gain control. After the level of Ys signal is adjusted with VR2201, it is input the camera microcomputer. The BLC CONT and IRIS POSITION signals received from the AF-KEY C.B.A. is processed in the camera microcomputer together, to output the iris control signal (AE CONT) from pin 67. Thus the iris operation is controlled. (The BLC CONT signal is used for opening the iris. And, the IRIS POSITION signal is used to provide slower response as the opening is reduced or quicker response as the opening is increased.)

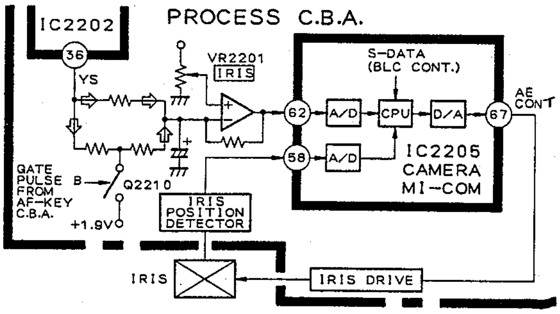

IC2202
PROCESS C.B.A.
36
YS
VR2201
IRIS
S-DATA
(BLC CONT.)
62
A/D
CPU
D/A
67
AE CONT
58
A/D
IC2205
CAMERA
MI-COM
GATE PULSE B
FROM AF-KEY C.B.A.
Q2210
+1.9V
IRIS POSITION DETECTOR
IRIS
IRIS DRIVE

Fig. I-51

When the manual iris mode is selected, the IRIS POSITION signal input to 58 of the camera microcomputer is fixed at the level detect at that point of time. For this purpose, the AE CONT signal issued from pin 67. Then, when the IRIS (+) or (-) key is pressed, the AE CONT signal is delivered so that the IRIS POSITION signal is provided accordingly to accomplish the iris control operation.

3-2-6 Signal separation circuit

(1) Luminance signal

The input signal to pin 4 of IC2202 gets rid of the blanking component through the blank- ing circuit and then it is output from pin 27. Thereafter, it is routed through the luminance signal low-pass filter and applied as the luminance signal having wide-range to the MATRIX C.B.A.

(2) Chrominance signal (Refer to 2-2-2)

The input signal to pin 4 of IC2202 is subjected to sampling-holding with two signals SP1 and SP2 respectively. Through sampling-holding with the SP1 signal, the G+Cy and Mg+Cy video signals are attained. And, through sampling-holding with the SP2 signal, the Mg+Ye and G+Cy video signals are attained. After separation, the chrominance signal is output from pins 29 and 32 through the low-pass filter and blanking circuit. Then, it is sent to the RGB signal generator circuit on the MATRIX C.B.A.

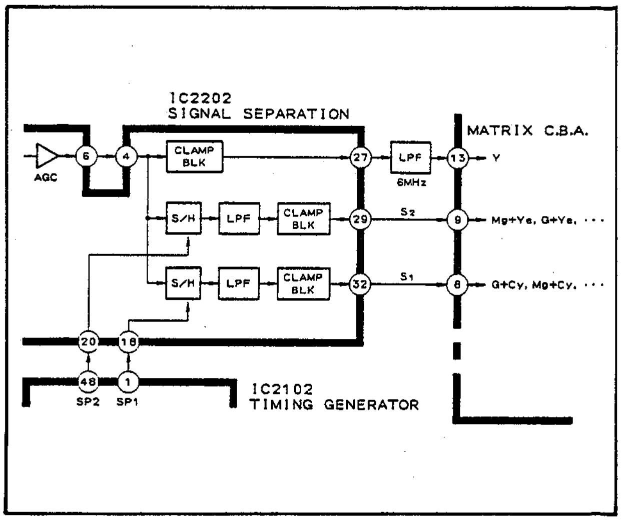

IC2202
SIGNAL SEPARATION
MATRIX C.B.A.
AGC
6
4
CLAMP BLK
27
LPF
6MHz
13
Y
S/H
LPF
CLAMP BLK
29
S2
9
Mg+Ye, G+Ye, · · ·
S/H
LPF
CLAMP BLK
32
S1
8
G+Cy, Mg+Cy, · · ·
20
18
48
1
SP2
SP1
IC2102
TIMING GENERATOR

Fig. I-52

3-2-7 MATRIX C.B.A.

The MATRIX C.B.A. is used to generate the R, G and B signals from G+Cy, Mg+Cy, Mg+Ye and G+Ye signals, perform gamma correction of the luminance signal, and produce the vertical aperture signal, etc.

(1) RGB signal generator circuit (Refer to 2-2-2)

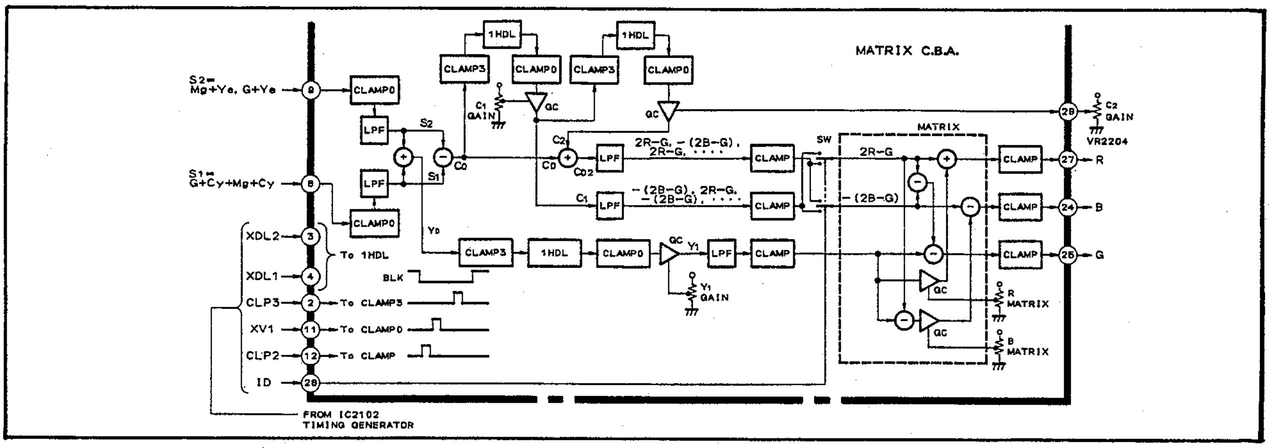

MATRIX C.B.A.
S2= Mg+Ye, G+Ye
9
S1= G+Cy+Mg+Cy
8
CLAMP0
LPF
S2
S1
C0
Y0
1HDL
CLAMP3
CLAMP0
C1 GAIN
GC
C2
C0
C02
C1
LPF
2R−G, −(2B−G), 2R−G, · · · ·
−(2B−G), 2R−G, −(2B−G), · · · ·
CLAMP
SW
MATRIX
2R−G
−(2B−G)
XDL2
3
XDL1
4
To 1HDL
BLK
CLP3
2
To CLAMP3
XV1
11
To CLAMP0
CLP2
12
To CLAMP
ID
28
FROM IC2102 TIMING GENERATOR
Y1
Y1 GAIN
28
C2 GAIN
VR2204
27
R
24
B
25
G
R MATRIX
B MATRIX

Fig. I-53

The S1 and S2 signals input from pins 8 and 9 of the MATRIX C.B.A. are clamped and passed through the low-pass filter for band limitation. Then, after subtraction and addition, these signals are divided into the C and Y signals for RGB signal generation. The C and Y signals are fed to the 1HDL, SW and matrix circuits, and output as the R, G and B signals from pins 27, 25 and 24.

° C signal processing

Through subtraction 'S2-S1', the 2R-G and -(2B-G) signals are output alternately per H. The C1 signal is produced with 1HDL, and the C02 signal is produced through averaging of the preceding and succeeding signals attained during a certain period (C0 without delay, and C2 with 2HDL). Using the C0 and C02 signals, both the 2R-G and -(2B-G) signals are provided. Since the 2R-G and -(2B-G) signals are given alternately to the C1 and C02 signals, switchover per H is performed with the ID pulse input from pin 28. Thus, the 2R-G and -(2B-G) signals are input to the matrix circuit in continuous stream.

The GC (gain control) circuit following 1HDL is used for correcting a gain difference in 1HDL, and the low-pass filter is used for removing the clock component in 1HDL. Note that the variable resistors mounted on the MATRIX C.B.A. have been preadjusted at the factory (to be fixed unless otherwise required).

° Y signal processing (Narrow-range luminance signal for chrominance signal processing)

Through addition 'S2+S1', the Y0 signal is output from + for RGB signal generation. The Y0 signal is fed to the 1HDL circuit for adjusting the timing with C1 signal, and then it is input to the matrix circuit.

° Matrix circuit

The 2R-G, -(2B-G) and Y1 signals input to the matrix circuit are subjected to the processing mentioned in 'New Technologies' and then output as the R, G and B signals from pins 27, 25 and 24.

(2) Luminance signal processing (Wide-range luminance signal)

The luminance signal input to the MATRIX C.B.A. undergoes clamping and gamma correction, and then it is output from pin 7 through the 1HDL circuit that adjusts the timing with the chroma signal passing through the RGB signal generator circuit. The signal output from pin 7 passes through the luminance low-pass filter for clock elimination, and goes back to the MATRIX C.B.A. Then, after amplified and clamped, this signal is delivered from pin 20. Thereafter, through the FL2240 circuit (300ns delay), it is input to the ENCODER C.B.A.

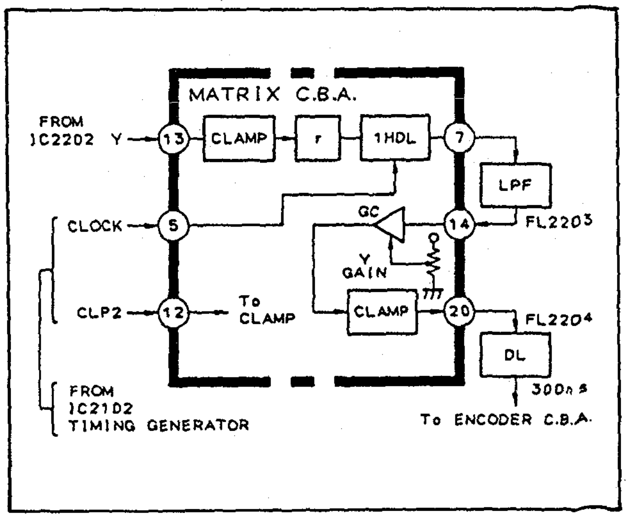


Fig. I-54

(3) V aperture (VAP) and chroma suppression (CSY) signals

The V aperture (VAP) signal and the chroma suppression (CSY) signal are generated in the MATRIX C.B.A. The VAP signal is produced from the YL signal for RGB signal generation, and the CSY signal is used for suppressing the chroma signal according to Y level.

° V aperture (VAP) signal

The Y0 signal attained by 'S1+S2', Y1 signal with 1HDL, and Y2 signal with 2HDL are used for generation of VAP signal. After addition of Y0 and Y2, the resultant signal is subjected to 1/2 division and subtraction by Y1. Thus, the VAP signal shown in the low part in Fig. I-55 can be attained. The VAP signal then passes through the low-pass filter and clamp circuit and goes to the slice circuit, where the low-level signal (noise) and excessive Y component are sliced out. Then, the VAP signal is output from pin 23 of the MATRIX C.B.A.

° Chroma suppression (CSY) signal

The CSY signal is produced using the Y1 signal. It is output when the Y1 signal level becomes 1.2 times higher than the standard level. After slicing, the absolute value of VAP signal is mixed to suppress the color in the V aperture section. Then, after blanking is made, it is delivered from pin 22 of the MATRIX C.B.A.

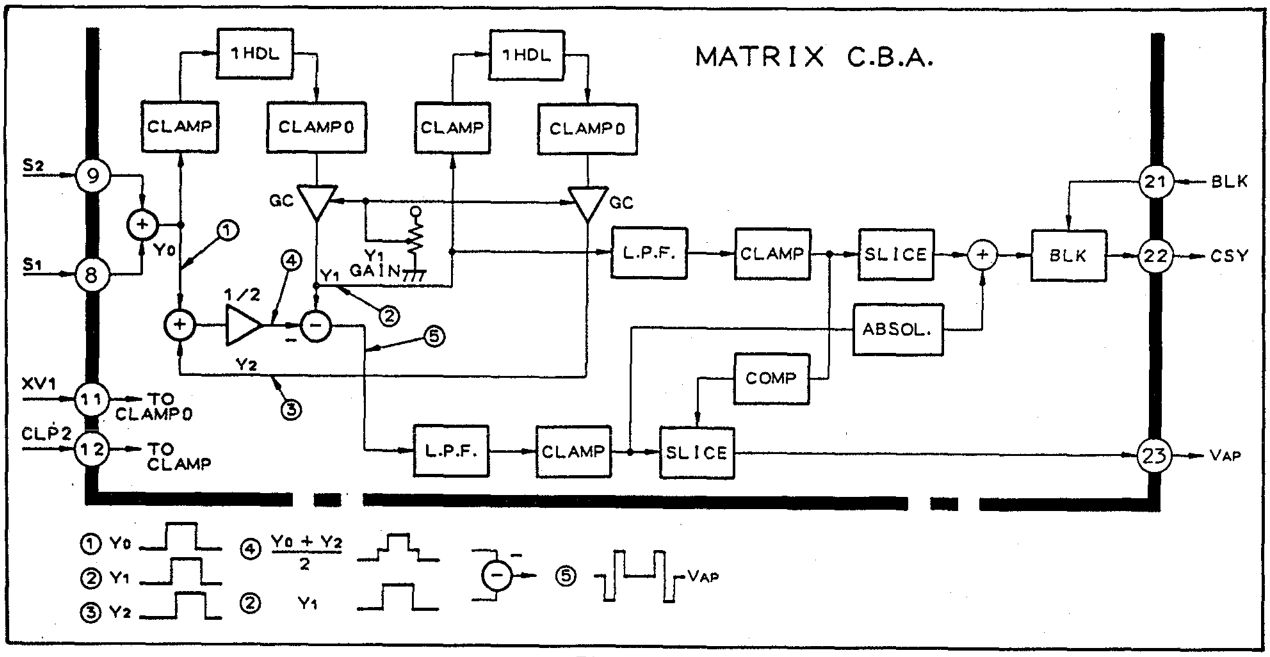

MATRIX C.B.A.
1HDL
1HDL
CLAMP
CLAMP0
CLAMP
CLAMP0
S2
9
S1
8
XV1
11
TO CLAMP0
CLP2
12
TO CLAMP
GC
GC
Y0
Y1
Y1 GAIN
1/2
Y2
①
②
③
④
⑤
L.P.F.
CLAMP
SLICE
BLK
ABSOL.
COMP
L.P.F.
CLAMP
SLICE
21
BLK
22
CSY
23
VAP
① Y0
② Y1
③ Y2
④ (Y0 + Y2)/2
② Y1
⑤
VAP

Fig. I-55

3-2-8 ENCODER C.B.A.

The ENCODER C.B.A. processes the R, G and B signals furnished from the MATRIX C.B.A. and outputs the Y/C-separated video signals.

(1) RGB signal processing

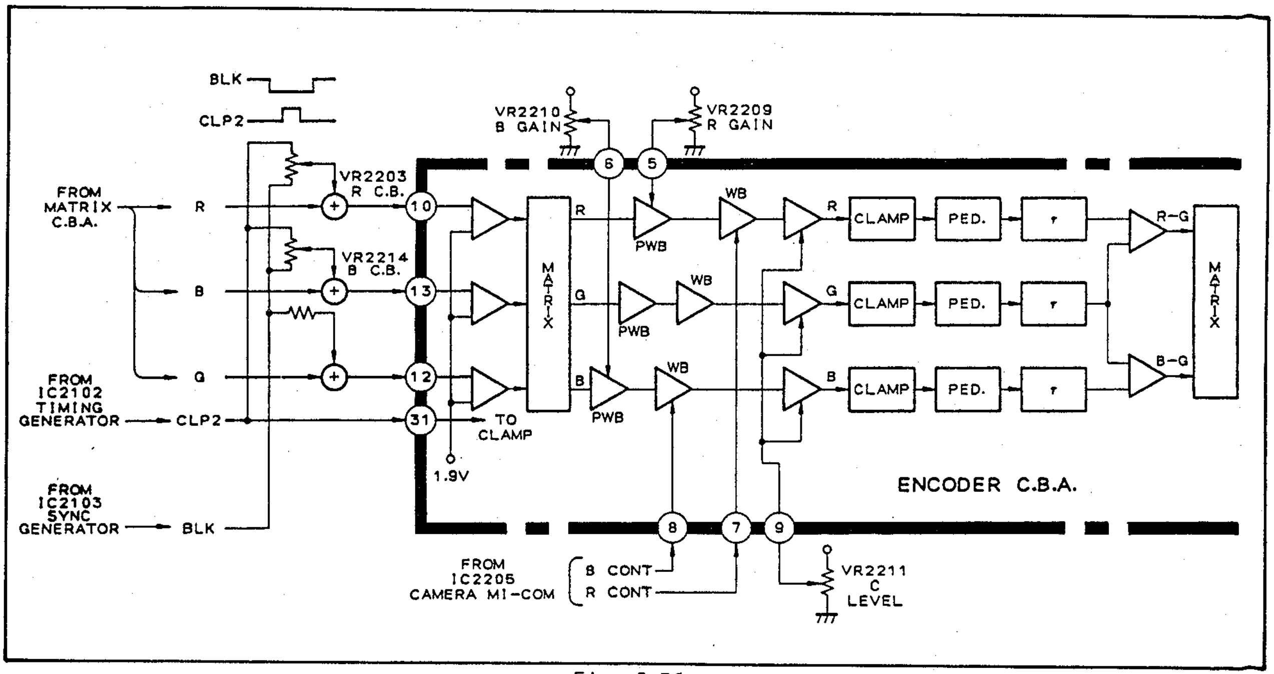

BLK
CLP2
VR2210 B GAIN
VR2209 R GAIN
VR2203 R C.B.
VR2214 B C.B.
FROM MATRIX C.B.A.
R
B
G
FROM IC2102 TIMING GENERATOR
CLP2
FROM IC2103 SYNC GENERATOR
BLK
10
13
12
31
TO CLAMP
1.9V
MATRIX
R
G
B
PWB
WB
6
5
CLAMP
PED.
γ
R−G
B−G
MATRIX
ENCODER C.B.A.
8
7
9
FROM IC2205 CAMERA MI-COM
B CONT
R CONT
VR2211 C LEVEL

Fig. I-56

The R, G and B signals output from the MATRIX C.B.A. are carrier-balanced before they are input to the ENCODER C.B.A. That is, the R and B signals are mixed with the BLK and CLP2 pulses (mixing ratio adjusted with VR), and the G signal is mixed with the BLK pulse. By adjusting the mixing ratio of the BLK and CLP2 pulses, the black level at the point to be clamped (in the clamp circuit) is changed for proper carrier balancing.

The R, G and B signals input to pins 10, 12 and 13 of the ENCODER C.B.A. are subjected to differential amplification by the input signal from pin 11 (MATRIX C.B.A.) and the final clamping voltage (DC IN: black level of R, G and B signals). Then, through the matrix circuit, these signals are furnished to the white balance circuit. In this circuit, white balance presetting is made by the PWB amplifiers Connected with VR2209 and 10 (R gain, B gain). Then, using the B CONT and R CONT signals received from the CAMERA microcomputer, white balancing is accomplished by the WB amplifiers.

After white balancing, the R, G and B signals are subjected to entire gain setting with VR2211 (C level), and input to the gamma correction circuit through the PED circuit which is used for clamping and compressing near-black-level noise. The R, G and B signals subjected to gamma correction are sent to the matrix circuit for color difference signal generation.

(2) Color difference signal generation

After gamma correction, the R, G and signals are converted into the R-G and G-B signals and sent to the color difference signal generation matrix. In this matrix circuit, the following color difference signals are generated from the G-R and G-B signals:

$$R-Y = 0.11(G-B) - 0.7(G-R)$$
$$B-Y = 0.3(G-R) - 0.89(G-B)$$

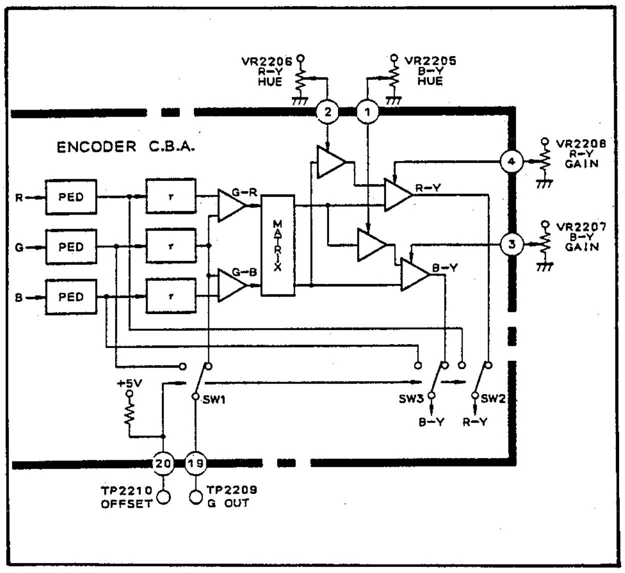

VR2206
R-Y
HUE
VR2205
B-Y
HUE
2
1
ENCODER C.B.A.
4
VR2208
R-Y
GAIN
R
G
B
PED
PED
PED
γ
γ
γ
G-R
G-B
MATRIX
R-Y
B-Y
3
VR2207
B-Y
GAIN
+5V
SW1
SW3
SW2
B-Y
R-Y
20
19
TP2210
OFFSET
TP2209
G OUT

Fig. I-57

Thereafter, the color difference signals are adjusted for hue and gain with VR2205 and 6 (B-Y, R-Y hue) and VR2207 and 8 (B-Y, R-Y gain), and then sent to the modulator circuit.

The SW1, 2 and 3 output signals are set as indicated below through H/L selection at pin 20 of the ENCODER C.B.A. In the L state, C-level adjustment is carried out. (Normal: high, in C-LEVEL adjusting: low)

20 pin (OFFSET)	SW1	SW2	SW3
H	G (after gamma correction)	R-Y	B-Y
L	G (before gamma correction)	R	B

(3) Chrominance modulation/output circuit

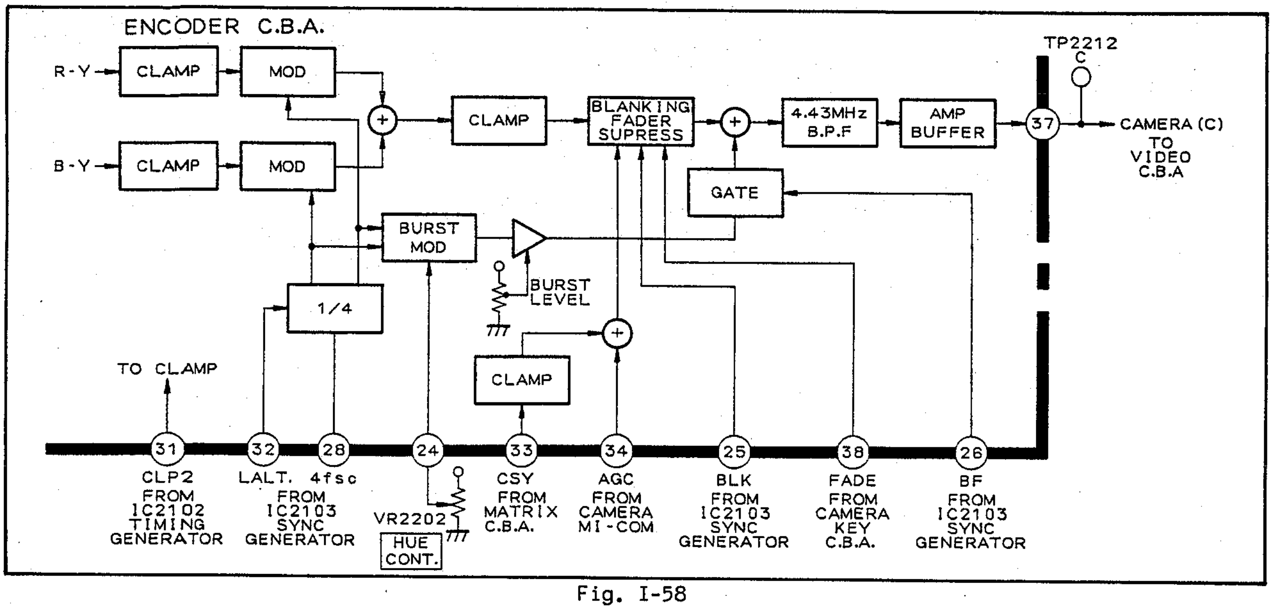

ENCODER C.B.A.
R-Y
CLAMP
MOD
B-Y
CLAMP
MOD
CLAMP
BLANKING FADER SUPRESS
4.43MHz B.P.F
AMP BUFFER
TP2212 C
37
CAMERA (C) TO VIDEO C.B.A
GATE
BURST MOD
BURST LEVEL
1/4
CLAMP
TO CLAMP
31
32
28
24
33
34
25
38
26
CLP2 FROM IC2102 TIMING GENERATOR
LALT. 4fsc FROM IC2103 SYNC GENERATOR
VR2202
HUE CONT.
CSY FROM MATRIX C.B.A.
AGC FROM CAMERA MI-COM
BLK FROM IC2103 SYNC GENERATOR
FADE FROM CAMERA KEY C.B.A.
BF FROM IC2103 SYNC GENERATOR

Fig. I-58

The R-Y and B-Y signals are clamped and then modulated to 4.43 MHz with each subcarrier and ALTERNATE signal which inverts in every 1H. For this modulation, the 4 fsc signal input to pin 28 is frequency-divided into 1/4 to produce the subcarries whose phases are 90° opposite to each other.

The modulated R-Y and B-Y output signals are synthesized, clamped and subjected to blanking, facing and suppression processing. The suppressor circuit is controlled by the CSY signal (for color elimination of high luminance part and V aperture part) and the AGC signal (for color compression of low luminance part).

Thereafter, the burst signal generated from the subcarrier is mixed. After 4.43 MHz band-pass filtration and amplification, the chroma signal [CAMERA (C)] is thus output from pin 37 of the ENCODER C.B.A.

(4) Luminance signal circuit

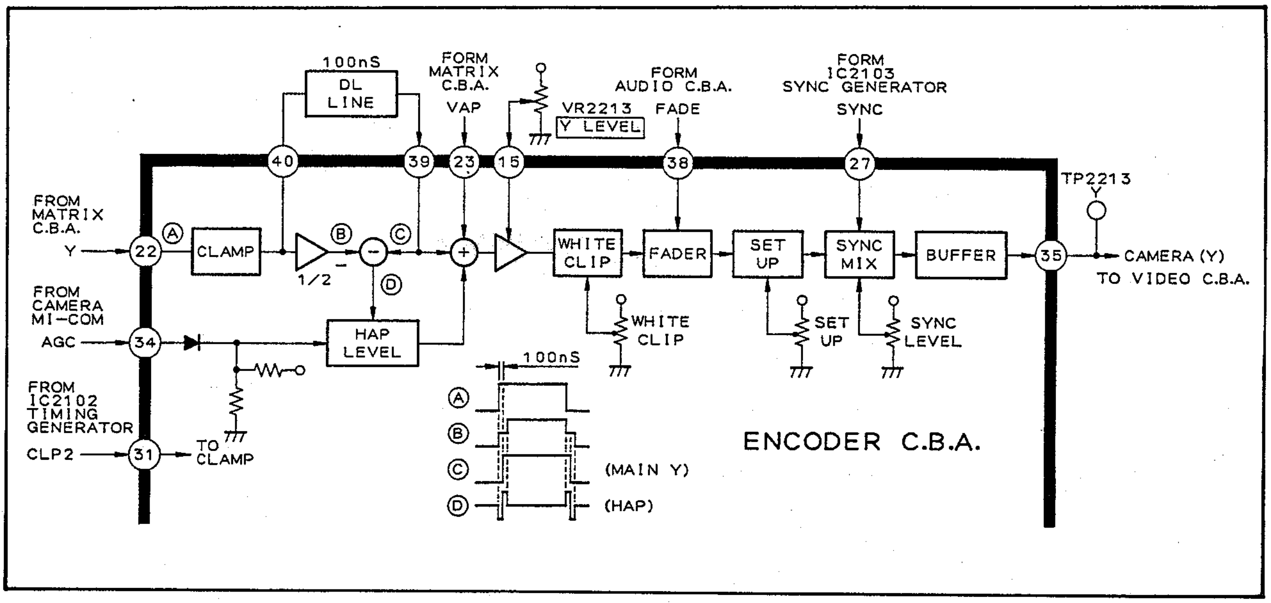

100nS DL LINE
FORM MATRIX C.B.A. VAP
VR2213 Y LEVEL
FORM AUDIO C.B.A. FADE
FORM IC2103 SYNC GENERATOR SYNC
40
39
23
15
38
27
TP2213 Y
FROM MATRIX C.B.A. Y
22
Ⓐ
CLAMP
1/2
Ⓑ
Ⓒ
Ⓓ
WHITE CLIP
FADER
SET UP
SYNC MIX
BUFFER
35
CAMERA (Y) TO VIDEO C.B.A.
FROM CAMERA MI-COM AGC
34
HAP LEVEL
WHITE CLIP
SET UP
SYNC LEVEL
100nS
FROM IC2102 TIMING GENERATOR CLP2
31
TO CLAMP
Ⓐ
Ⓑ
Ⓒ (MAIN Y)
Ⓓ (HAP)
ENCODER C.B.A.

Fig. I-59

3-2-10 Slow shutter circuit

The block diagram of slow shutter operation is shown in Fig. I-61 below.

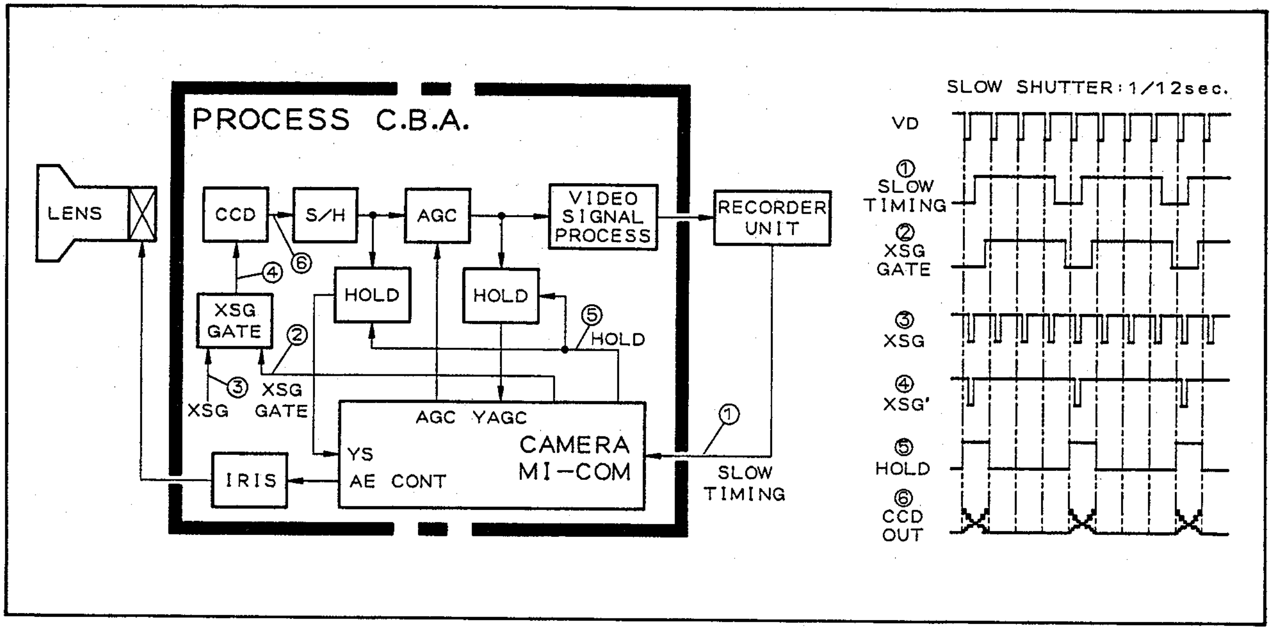

PROCESS C.B.A.
LENS
CCD
S/H
AGC
VIDEO SIGNAL PROCESS
RECORDER UNIT
④
⑥
XSG GATE
HOLD
HOLD
⑤ HOLD
②
③ XSG
XSG GATE
AGC YAGC
YS
CAMERA MI-COM
AE CONT
IRIS
①
SLOW TIMING
SLOW SHUTTER : 1/12sec.
VD
① SLOW TIMING
② XSG GATE
③ XSG
④ XSG'
⑤ HOLD
⑥ CCD OUT

Fig. I-61

Slow shutter: Reads out only once per several fields from photosensor of CCD, and intended to up the sensitivity of CCD or the special effect by prolonging accumulating time. For such purpose, image signal from camera-U is output only once per several fields.

In slow shutter mode, a slow timing signal is transmitted from recorder-U. Camera microcomputer enacts slow shutter motion, outputting the following XSG gate, hold signals, upon receiving the slow timing singal.

° XSG gate:
This is the signal which thins the read out pulse (XSG) of CCD, and the number of pulse thus thinned determines the slow shutter time.

° Hold:
As, at slow shutter time, CCD output signal appears only once per several fields, signal hold circuit becomes necessary for controlling AGC and IRIS. This signal holds the AGC and IRIS control signals while the CCD output signal is absent.

(1) Circuit for read out pulse (XSG) purpose (Refer to Fig. I-62 below)

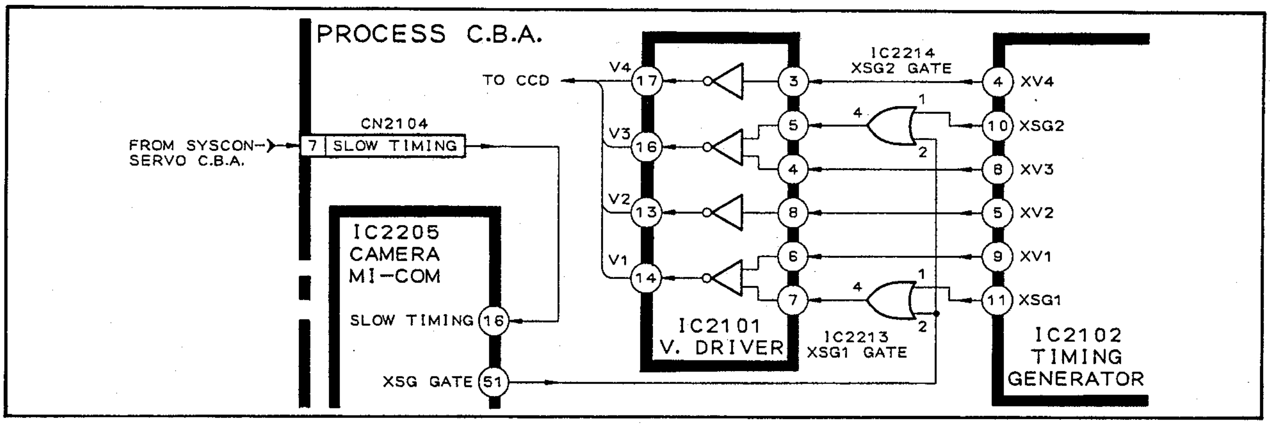

PROCESS C.B.A.
TO CCD
FROM SYSCON–SERVO C.B.A.
CN2104
7 SLOW TIMING
IC2205 CAMERA MI-COM
SLOW TIMING 16
XSG GATE 51
V4 17
V3 16
V2 13
V1 14
3
5
4
8
6
7
IC2101 V. DRIVER
IC2214 XSG2 GATE
IC2213 XSG1 GATE
1
2
4
4 XV4
10 XSG2
8 XV3
5 XV2
9 XV1
11 XSG1
IC2102 TIMING GENERATOR

Fig. I-62

(3) Chrominance modulation/output circuit

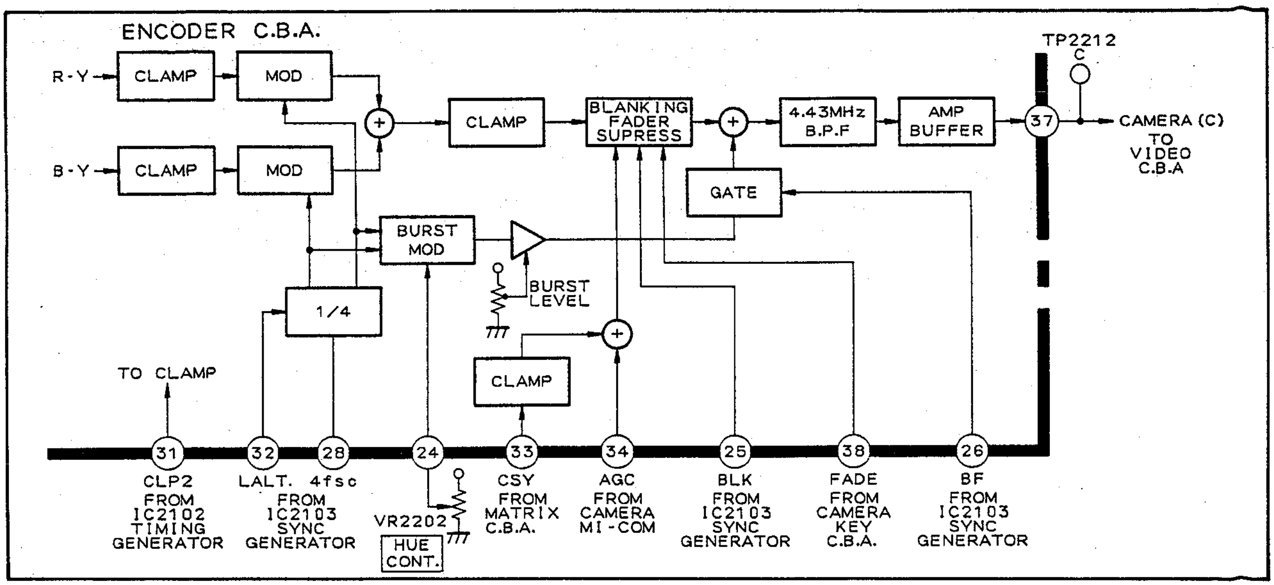

ENCODER C.B.A.
R-Y
B-Y
CLAMP
MOD
CLAMP
BLANKING FADER SUPRESS
4.43MHz B.P.F
AMP BUFFER
TP2212
C
CAMERA (C) TO VIDEO C.B.A
37
GATE
BURST MOD
BURST LEVEL
1/4
TO CLAMP
31
32
28
24
33
34
25
38
26
CLP2 FROM IC2102 TIMING GENERATOR
LALT. 4fsc FROM IC2103 SYNC GENERATOR
VR2202
HUE CONT.
CSY FROM MATRIX C.B.A.
AGC FROM CAMERA MI-COM
BLK FROM IC2103 SYNC GENERATOR
FADE FROM CAMERA KEY C.B.A.
BF FROM IC2103 SYNC GENERATOR

Fig. I-58

The R-Y and B-Y signals are clamped and then modulated to 4.43 MHz with each subcarrier and ALTERNATE signal which inverts in every 1H. For this modulation, the 4 fsc signal input to pin 28 is frequency-divided into 1/4 to produce the subcarries whose phases are 90° opposite to each other.

The modulated R-Y and B-Y output signals are synthesized, clamped and subjected to blanking, facing and suppression processing. The suppressor circuit is controlled by the CSY signal (for color elimination of high luminance part and V aperture part) and the AGC signal (for color compression of low luminance part).

Thereafter, the burst signal generated from the subcarrier is mixed. After 4.43 MHz band-pass filtration and amplification, the chroma signal [CAMERA (C)] is thus output from pin 37 of the ENCODER C.B.A.

(4) Luminance signal circuit

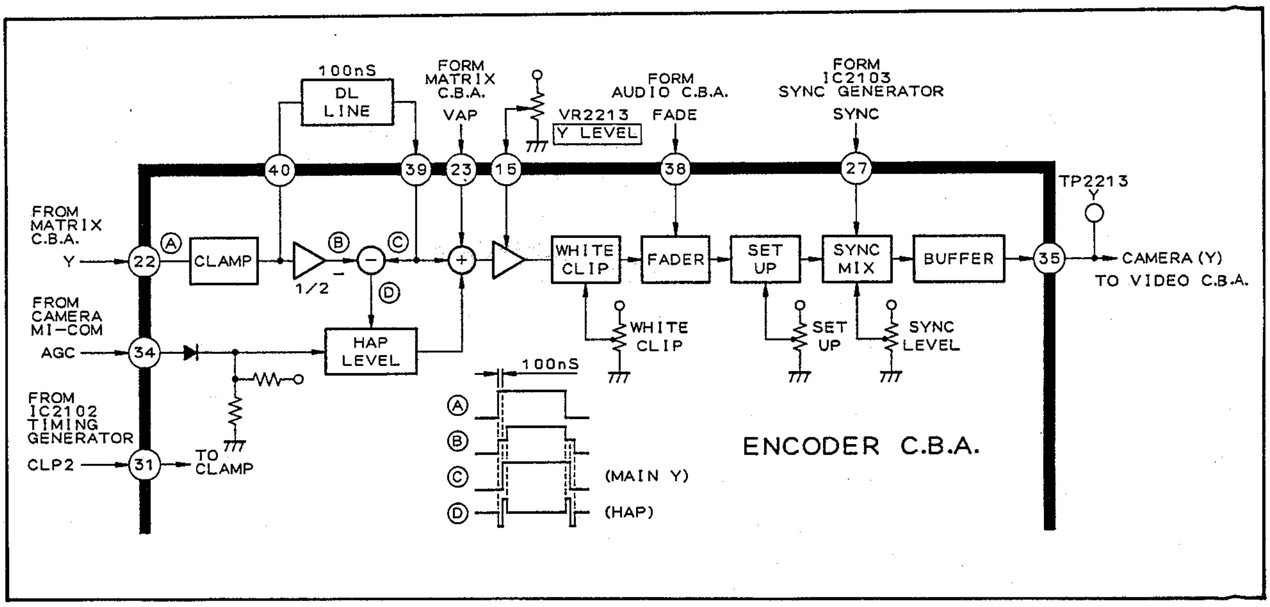

100nS
DL LINE
FORM MATRIX C.B.A.
VAP
VR2213
Y LEVEL
FORM AUDIO C.B.A.
FADE
FORM IC2103 SYNC GENERATOR
SYNC
40
39
23
15
38
27
TP2213
Y
FROM MATRIX C.B.A.
Y
22
Ⓐ
CLAMP
1/2
Ⓑ
Ⓒ
Ⓓ
WHITE CLIP
FADER
SET UP
SYNC MIX
BUFFER
35
CAMERA (Y) TO VIDEO C.B.A.
FROM CAMERA MI-COM
AGC
34
HAP LEVEL
WHITE CLIP
SET UP
SYNC LEVEL
FROM IC2102 TIMING GENERATOR
CLP2
31
TO CLAMP
100nS
Ⓐ
Ⓑ
Ⓒ
Ⓓ
(MAIN Y)
(HAP)
ENCODER C.B.A.

Fig. I-59

The Y signal from the MATRIX C.B.A. is input to pin 22 of ENCODER C.B.A. and routed to the external delay line via the clamp circuit. Then it is input to the ENCODER C.B.A. gain.

° H aperture signal

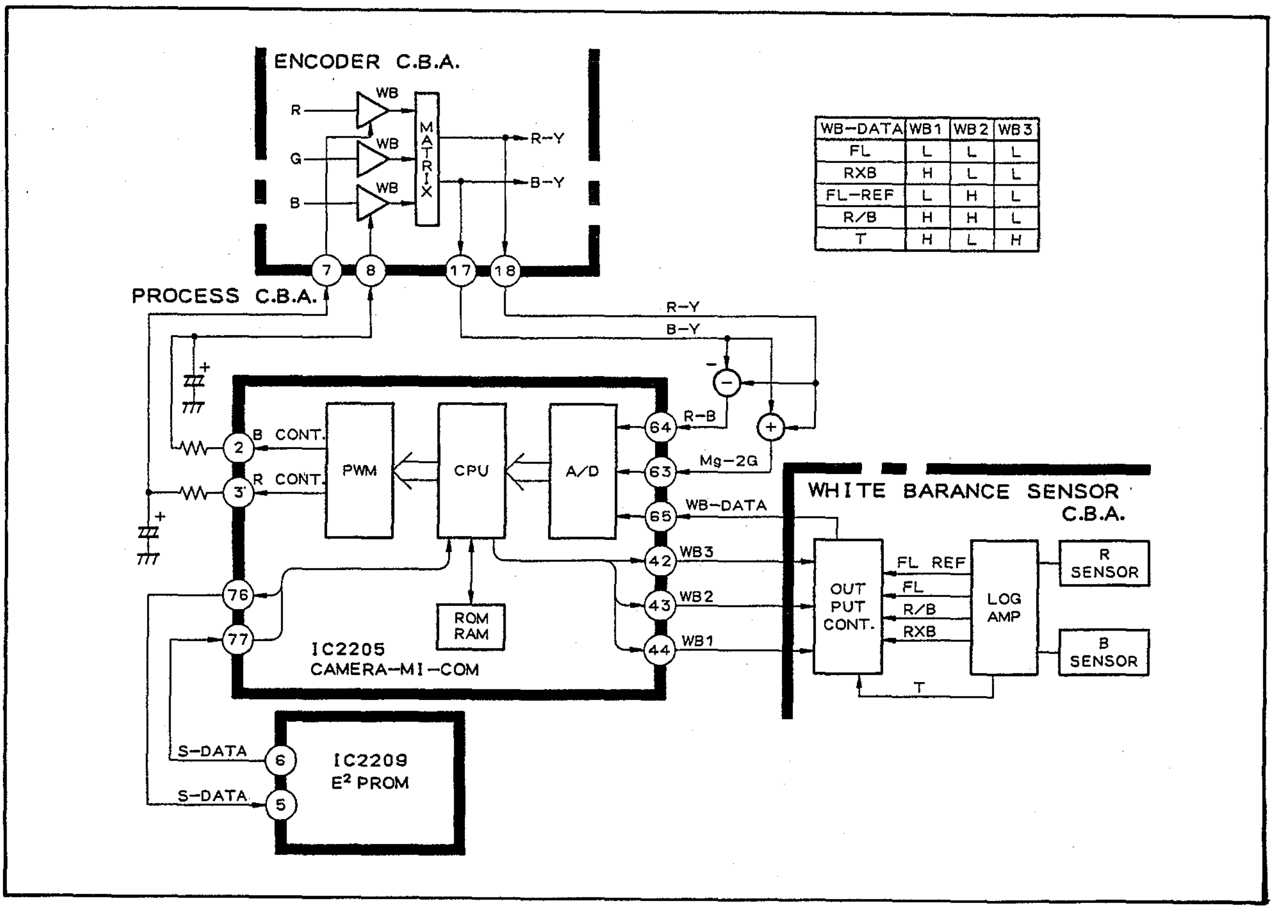
Since the Y signal input to pin 39 has high impedance, it is reflected to cause a delay of 100 ns. It is then added to the raw signal at pin 40. Through subtraction on the signals B and C appearing at pins 39 and 40, the H aperture signal D is attained. This H aperture signal is subjected to level setting by the HAP LEVEL circuit and slice level adjustment with AGC, and then it is mixed into the Y signal together with the VAP signal.

° Y signal

The Y signal mixed with the H aperture signal undergoes gain setting with VR2213 (Y level) and then fed to the white clip circuit. In this circuit, the Y signal gets rid of its high level component. After the Y signal passes through the fade circuit (white fading), the setup is added to it. Thereafter, mixed with the SYNC signal, the Y signal [CAMERA (Y)] is output from pin 35 of the ENCODER C.B.A.

* The variable resistor mounted on the ENCODER C.B.A. has been factory-preadjusted as on the MATRIX C.B.A.

3-2-9 AWB control circuit


ENCODER C.B.A.
R
G
B
WB
WB
WB
MATRIX
R-Y
B-Y
7
8
17
18
PROCESS C.B.A.
R-Y
B-Y
R-B
Mg-2G
B CONT.
R CONT.
2
3
PWM
CPU
A/D
64
63
65
WB-DATA
42
WB3
43
WB2
44
WB1
76
77
ROM RAM
IC2205
CAMERA-MI-COM
S-DATA
6
S-DATA
5
IC2209
E² PROM
WHITE BARANCE SENSOR C.B.A.
OUT PUT CONT.
FL REF
FL
R/B
RXB
T
LOG AMP
R SENSOR
B SENSOR

WB-DATA	WB1	WB2	WB3
FL	L	L	L
RXB	H	L	L
FL-REF	L	H	L
R/B	H	H	L
T	H	L	H

Fig. I-60

° In FAWB operation

The CAMERA microcomputer outputs the WB1, 2 and 3 signals from pins 42, 43 and 44 to select the WB sensor output signal (WB-DATA). The relationship between the WBL-3 signals and WB-DATA signal is tabled in Fig. I-60. In one field, the selection of five WB sensor output signals is made. The WB-DATA signal is processed in the CAMERA microcomputer to detect a color temperature in external metering.

To provide internal-metering color temperature data, the R-Y and B-Y signals output from the ENCODER C.B.A. are added and subtracted to attain the Mg-2G and R-B signals, which are also input to the CAMERA microcomputer via pins 63 and 64. In the CAMERA microcomputer, the two-axis correction is carried out with the Mg-2G and R-B signals according to the external-metering color temperature data. Thus, the PWM white balance control signals (R CONT, B CONT) are output from pins 2 and 3.

The R CONT and B CONT signals output from the CAMERA microcomputer are routed through the resistor and capacitor for integration (DC conversion). Thereby, the WB gain amplifiers in the ENCODER C.B.A. are controlled to accomplish white balancing.

° In AWB setting

In the AWB setting mode, the CAMERA microcomputer carries out only the two-axis correction with the Mg-2G and R-B signals input to pins 63 and 64. Therefore, every hue displayable on victor-scope can be put at the center area.

3-2-10 Slow shutter circuit

The block diagram of slow shutter operation is shown in Fig. I-61 below.

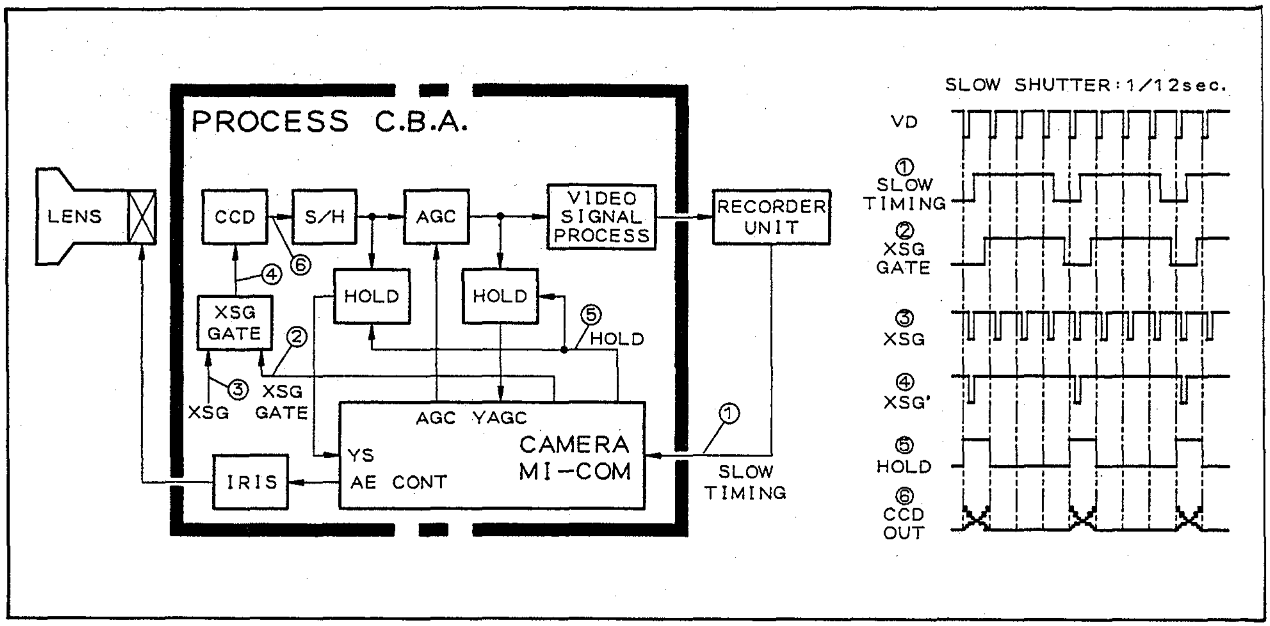

PROCESS C.B.A.
LENS
CCD
S/H
AGC
VIDEO SIGNAL PROCESS
RECORDER UNIT
④
⑥
HOLD
HOLD
XSG GATE
②
⑤
HOLD
③ XSG
XSG GATE
AGC YAGC
YS
CAMERA MI-COM
AE CONT
IRIS
①
SLOW TIMING
SLOW SHUTTER: 1/12sec.
VD
① SLOW TIMING
② XSG GATE
③ XSG
④ XSG'
⑤ HOLD
⑥ CCD OUT

Fig. I-61

Slow shutter: Reads out only once per several fields from photosensor of CCD, and intended to up the sensitivity of CCD or the special effect by prolonging accumulating time. For such purpose, image signal from camera-U is output only once per several fields.

In slow shutter mode, a slow timing signal is transmitted from recorder-U. Camera microcomputer enacts slow shutter motion, outputting the following XSG gate, hold signals, upon receiving the slow timing singal.

- XSG gate:
  This is the signal which thins the read out pulse (XSG) of CCD, and the number of pulse thus thinned determines the slow shutter time.

- Hold:
  As, at slow shutter time, CCD output signal appears only once per several fields, signal hold circuit becomes necessary for controlling AGC and IRIS. This signal holds the AGC and IRIS control signals while the CCD output signal is absent.

(1) Circuit for read out pulse (XSG) purpose (Refer to Fig. I-62 below)

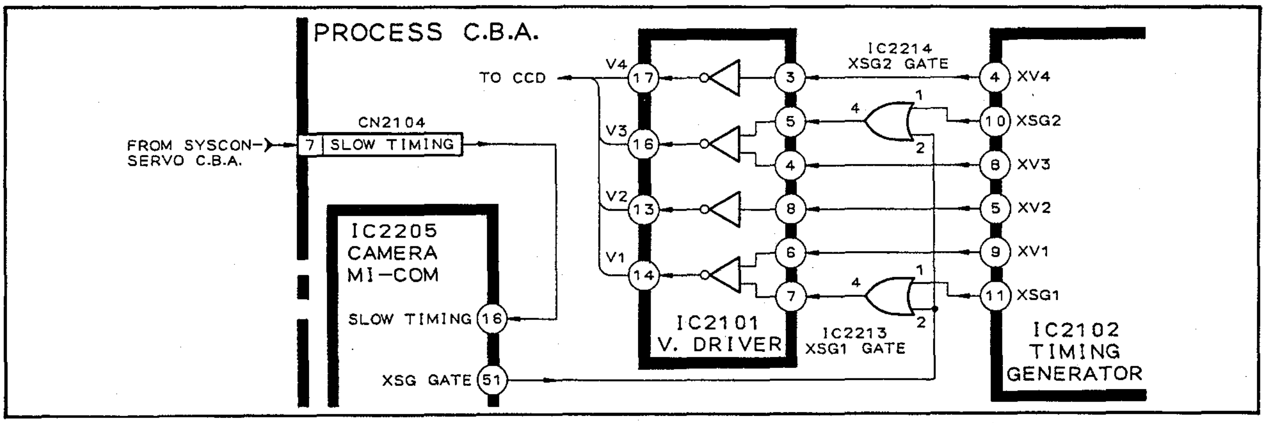

PROCESS C.B.A.
FROM SYSCON-SERVO C.B.A.
CN2104
7 SLOW TIMING
IC2205 CAMERA MI-COM
SLOW TIMING ⑯
XSG GATE (51)
TO CCD
V4
V3
V2
V1
⑰
⑯
⑬
⑭
IC2101 V. DRIVER
③
⑤
④
⑧
⑥
⑦
IC2214 XSG2 GATE
IC2213 XSG1 GATE
4
1
2
④ XV4
⑩ XSG2
⑧ XV3
⑤ XV2
⑨ XV1
⑪ XSG1
IC2102 TIMING GENERATOR

Fig. I-62

When the slow timing signal arrives from the SS C.B.A., the camera microcomputer outputs its delayed signal XSG gate from pin 57.

The XSG 1, 2 signals output from IC2102 passes through IC2213, 14 (XSG gate) at Ⓛ time, and is cut at Ⓗ time and the pulse is thinned.

(2) Hold circuit (Refer to Fig. I-63 below)

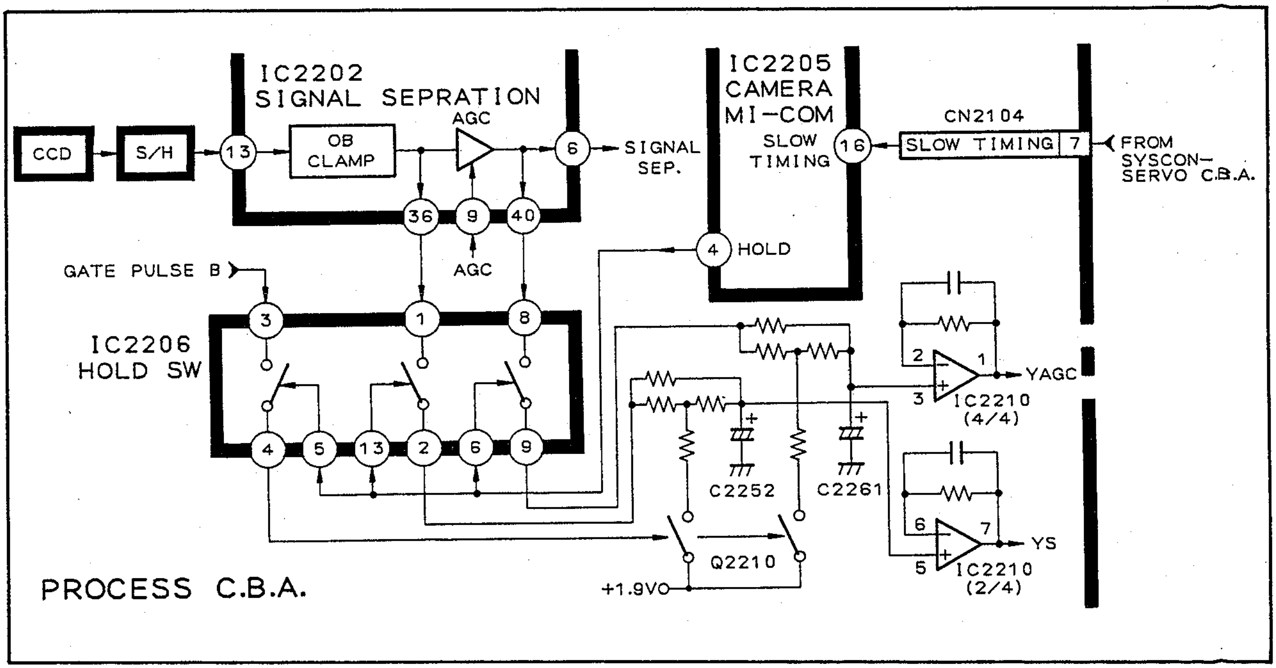

IC2202
SIGNAL SEPRATION
AGC
CCD
S/H
13
OB CLAMP
6
SIGNAL SEP.
36
9
40
AGC
GATE PULSE B
IC2206
HOLD SW
3
1
8
4
5
13
2
6
9
IC2205
CAMERA
MI-COM
SLOW TIMING
16
4
HOLD
CN2104
SLOW TIMING
7
FROM SYSCON-SERVO C.B.A.
C2252
C2261
Q2210
+1.9V
2
3
1
YAGC
IC2210 (4/4)
6
5
7
YS
IC2210 (2/4)
PROCESS C.B.A.

Fig. I-63

Normally, signals for AGC and IRIS output from IC2202 pins 36 and 40 is input to the operation amplifier (IC2210) via the IC 2206, and centrally weighted average photometry (R) and integrated calcuit (C).

At slow shutter time, the camera microcomputer pin 4 (Hold) turns Ⓛ during absence of video signal, and turns IC2206 SW off. During IC2206 SW OFF time, the YAGC and YS signals are held by C2252 and 2261 which fills the gap of video signal absence.

3-2-11 Pin function of camera microcomputer (IC2205)

Table I-5 (1/3)

Pin No.	Signal designation	I/O	Function
1	NC	-	Open.
2	B CONT	O	AWB B control signal.
3	R CONT	O	AWB R control signal.
4	HOLD	O	Hold signal of Y AGC, Y IRIS at slow shutter time.
5 ~ 12	NC	-	Open.
13	ADJ	I	AWB adjustment mode at "L" input time.

Table I-5 (2/3)

Pin No.	Signal designation	I/O	Function
14	NC	-	Open.
15	READY Ⓗ	O	Release signal for serial data communication between servo microcomptuer (IC101). Normally, can communicate at H. At AWB adjustment time or initial power supply setting time, turns low to communicate with E PROM (IC2209).
16	SLOW TIMING	I	Input of slow shutter motion timing pulse.
17	CAMERA 5V	I	Detection of camera 5V.
18	CAMERA-CS	I	Selection of chip for serial data communication between servo microcomptuer (IC101). Communicate during "H" period.
19	VD	I	Input of vertical synchronous signal.
20 ~ 24	NC	-	Open.
25	Vss	I	Connected to ground.
26	RESET Ⓛ	I	Microcomputer reset input at powr supply (6V) set time. Reset at "L" period which rises at a time lag with C-EVER 5V.
27	NC	-	Open.
28	X IN	I	10 MHz Connect X'TAL.
29	X OUT	O	
30	NC	-	Open.
31			
32	Vss	-	Connected to ground.
33	NTSC Ⓛ/PAL Ⓗ	I	NTSC/PAL switch.
34	WB ADJ A/M	I	AWB adjustment mode selection pin: H: Manual adjustment mode. L: Automatic adjustment mode.
35	TEST2	I	Function checks (Plant use).
36	PRESET	I	Turns "H" at camera electric adjustment time. AWB preset mode input pin.
37	NC	-	Open.
38	EN	O	Electronic Shutter ON/OFF switch H: ON L: OFF (Refer to Table I-6)
39	AE SW	I	Switching of AGC responding speed. Normally "H".
40	WB SW	I	WB characteristic switching. Normally "L".
41	NC	-	Open.
42	WB3		Selection signal of WB sensor output (WB-DATA).
43	WB2	O	(Refer to Table I-7)
44	WB1		
45	KEY OUT 4	O	Key matrix output.
46	KEY OUT 3		
47	KEY OUT 2		
48	KEY OUT 1		
49	KEY IN 4	I	Key matrix input.
50	KEY IN 3		
51	KEY IN 2		
52	KEY IN 1		
53	SHUTTER 2	O	Electronic shutter speed control ouptut. (Refer to Table I-6)
54	SHUTTER 1		
55	SHUTTER 0		
56	FL1		
57	XSG GATE	O	XSG (read out pulse) gate pulse at slow shutter time.
58	IRIS POSITION	I	Input of iris position detection.
59	YFL	I	Input of flicker detection signal.

Table I-5 (3/3)

Pin No.	Signal designation	I/O	Function
60	YAGC	I	Input of YAGC signal for AGC control.
61	NC	-	Open.
62	YS	I	Input of YS signal for iris control.
63	Mg-2G	I	Input of Mg-2G signal for AWB.
64	R-B	I	Input of R-B signal for AWB.
65	WB-DATA	I	Input of WB sensor.
66	AGC	O	Output of AGC control signal.
67	AE CONT	O	Output of iris control signal.
68	VREF (D/A)	I	Input of D/A converter reference voltage.
69	VREF (A/D)	I	Input of A/D converter reference voltage.
70	Vss	I	GND connection.
71	Vcc	I	Connect with CAMERA 5V.
72	Vcc	I	Connect with C-EVER 5V.
73	Vss	I	Connected to ground.
74	E^2PROM-CS	O	Chip select for serial data communication between E^2PROM (IC2209). Communicates during "H" period.
75	S-CLOCK	I/O	Clock output at serial data communication between servo microcomputer (IC101), E^2PROM (IC2209). Clock input at serial data communication time between AF microcomputer (IC2403).
76	S-DATA OUT	O	Output of data for serial data communication between servo microcomputer (IC101), E^2PROM (IC2209), AF microcomputer (IC2403).
77	S-DATA IN	I	Input of data for serial data communication between servo microcomputer (IC101), E^2PROM (IC2209), AF microcomptuer (IC2403).
78	FADE	O	Output of fade control voltage.
79	AF-CS	O	Output of communication request pulse between AF microcomputer (IC2403).
80	NC	-	Open.

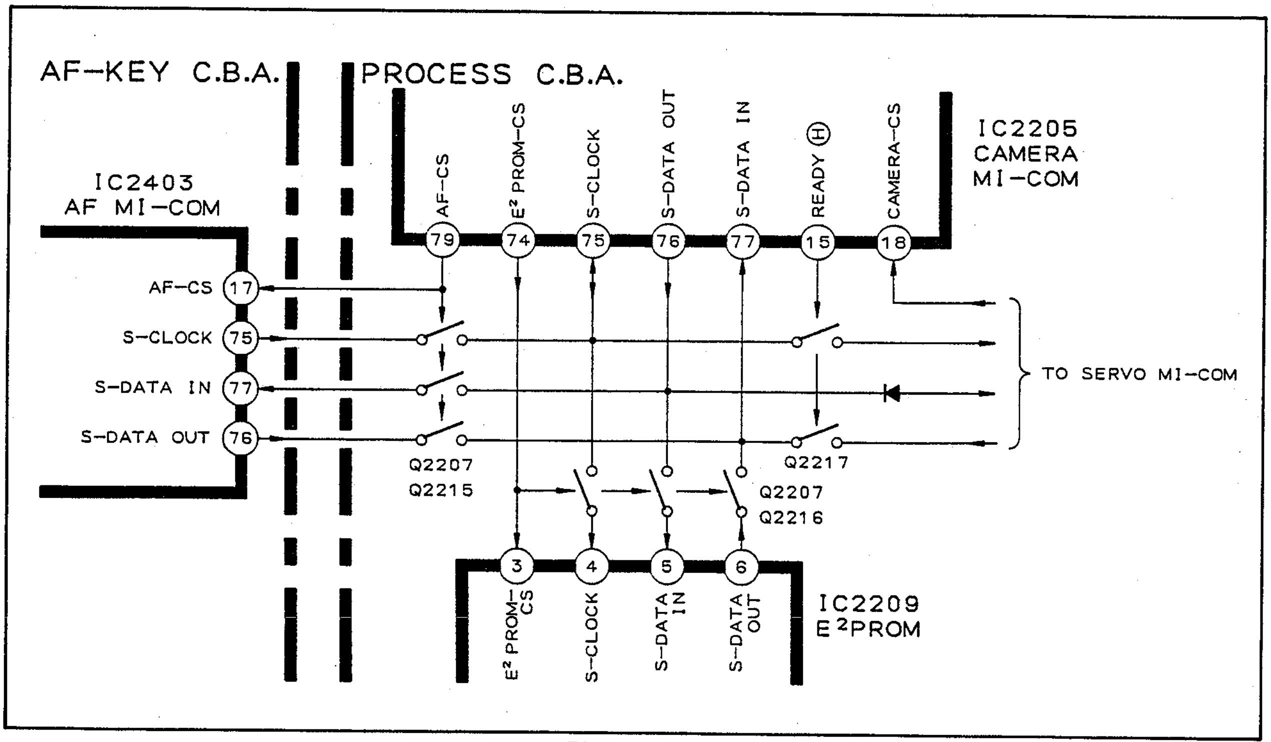
Table I-6
Shutter speed control signal (to IC2102)

SHUTTER SPEED	EN	FL1	SHUTTER 0	SHUTTER 1	SHUTTER 2
1/50	L	-	-	-	-
1/250	H	H	L	H	L
1/500	H	H	L	H	H
1/1000	H	H	H	L	L
1/2000	H	H	H	L	H
1/4000	H	H	H	H	L
1/10000	H	H	H	H	H
1/120	H	L	-	-	-

Table I-7
Output selection signal of WB sensor

WB-DATA	WB1	WB2	WB3
FL	L	L	L
RxB	H	L	L
FL REF	L	H	L
R/B	H	H	L
T	H	L	H

3-2-12 Method of communication between Camera microcomputer ↔ AF microcomputer, E^{2}PROM



AF–KEY C.B.A.
PROCESS C.B.A.
IC2403
AF MI–COM
AF–CS 17
S–CLOCK 75
S–DATA IN 77
S–DATA OUT 76
AF–CS
E² PROM–CS
S–CLOCK
S–DATA OUT
S–DATA IN
READY (H)
CAMERA–CS
79
74
75
76
77
15
18
IC2205
CAMERA
MI–COM
TO SERVO MI–COM
Q2207
Q2215
Q2217
Q2207
Q2216
3
4
5
6
E² PROM–CS
S–CLOCK
S–DATA IN
S–DATA OUT
IC2209
E²PROM

Fig. I-64

(1) Camera microcomputer ↔ AF microcomputer

Communication between camera microcomputer and AF microcomputer is done by pin 79 (AF-CS) during "H" period. (In the meantime, communication line with other microcomputers is disconnected.) The data from camera microcomputer to AF microcomputer contains such information as AF mode, shutter speed, zoom, etc. The data from AF microcomputer to camera microcomputer contains such information as BLC data, etc. The S-clock of camera microcomputer (pin 75) for this communication becomes input terminal.

(2) Camera microcomputer ↔ E^{2}PROM

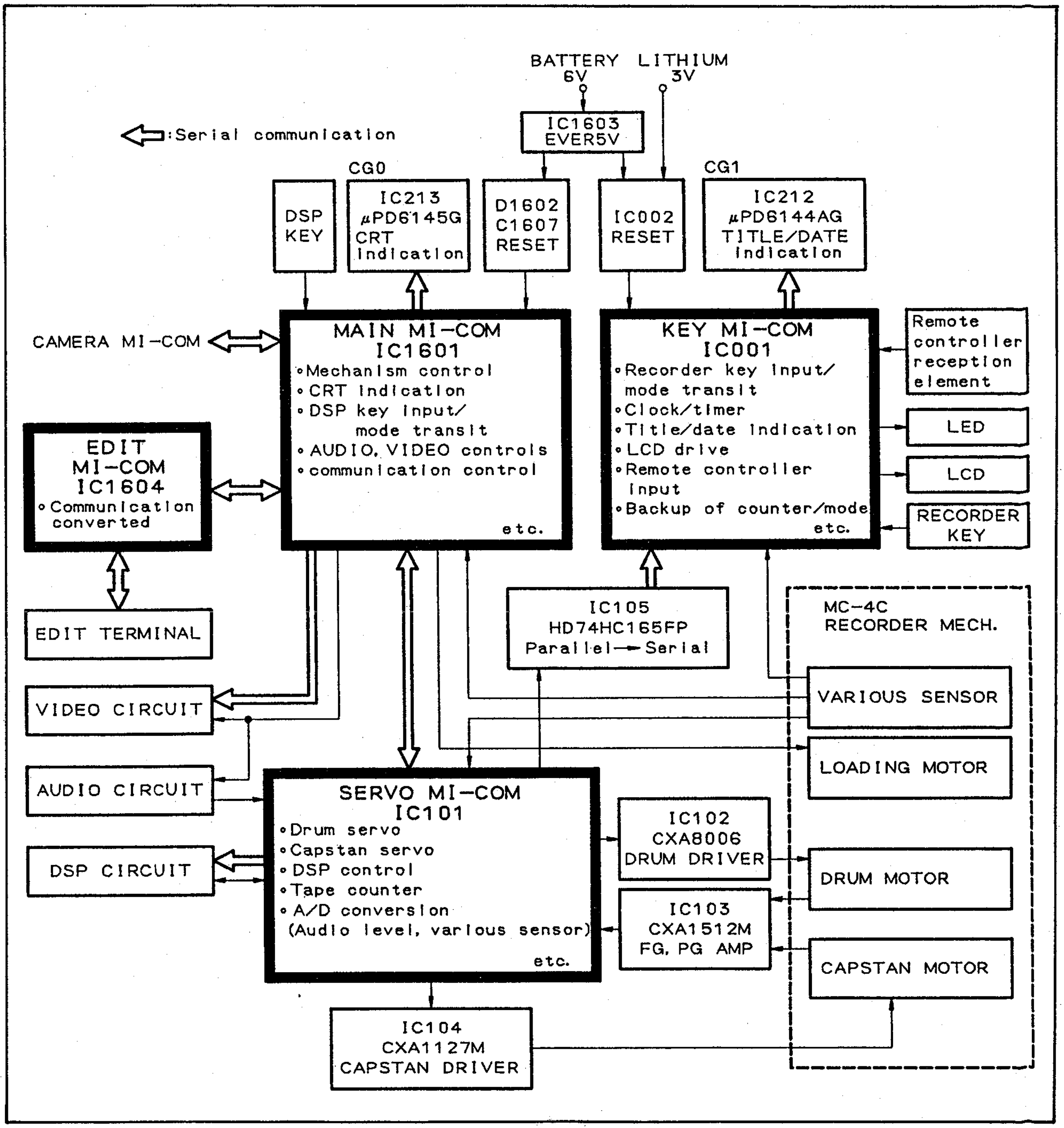
Communication between camera microcomputer and E^{2}PROM is done by pin 74 of E^{2}PROM during "H" period. (In the meantime, communication line with other microcomputer is disconnected.) This communication is done at the initial read out time following AWB, AF adjustment time and power supply (6V) connection. At such time, camera microcomputer pin 75 (S-clock) becomes output terminal.

3-3 Syscon-servo section

3-3-1 System control circuit

The system control operations are carried out primarily by the main microcomputer IC1601, KEY microcomputer IC001, and SERVO microcomputer IC101. The system control signals include; function key signals, mechanical switch signals, alarm sensor signals, servo data signals, remote controller signals, etc. These signals are interpreted, analyzed and processed by the above three microcomputers for control of various operations.

Serial communication is performed for signaling among these microcomputers, under control of the main microcomputer IC1601.



BATTERY 6V
LITHIUM 3V
:Serial communication
IC1603 EVER5V
CG0
CG1
DSP KEY
IC213 µPD6145G CRT indication
D1602 C1607 RESET
IC002 RESET
IC212 µPD6144AG TITLE/DATE indication
CAMERA MI-COM
MAIN MI-COM IC1601
∘Mechanism control
∘CRT indication
∘DSP key input/ mode transit
∘AUDIO, VIDEO controls
∘communication control
etc.
KEY MI-COM IC001
∘Recorder key input/ mode transit
∘Clock/timer
∘Title/date indication
∘LCD drive
∘Remote controller input
∘Backup of counter/mode
etc.
Remote controller reception element
LED
LCD
RECORDER KEY
EDIT MI-COM IC1604
∘Communication converted
EDIT TERMINAL
IC105 HD74HC165FP Parallel→Serial
MC-4C RECORDER MECH.
VARIOUS SENSOR
LOADING MOTOR
VIDEO CIRCUIT
AUDIO CIRCUIT
DSP CIRCUIT
SERVO MI-COM IC101
∘Drum servo
∘Capstan servo
∘DSP control
∘Tape counter
∘A/D conversion (Audio level, various sensor)
etc.
IC102 CXA8006 DRUM DRIVER
IC103 CXA1512M FG, PG AMP
DRUM MOTOR
CAPSTAN MOTOR
IC104 CXA1127M CAPSTAN DRIVER

Fig. I-65

3-3-2 Power supply circuit

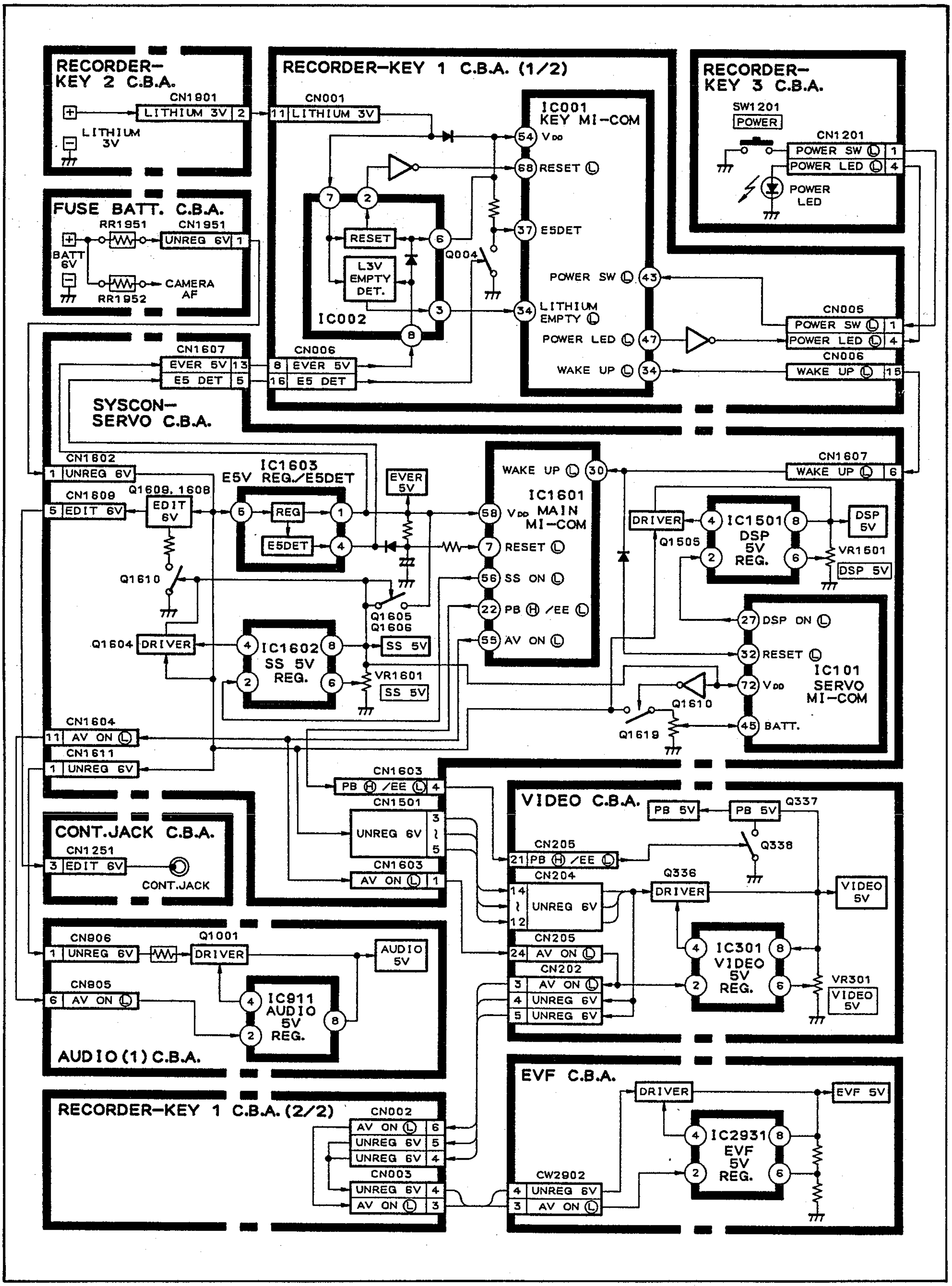

RECORDER-KEY 2 C.B.A.
CN1901
LITHIUM 3V
LITHIUM 3V
FUSE BATT. C.B.A.
RR1951
CN1951
UNREG 6V
BATT 6V
CAMERA AF
RR1952
RECORDER-KEY 1 C.B.A. (1/2)
CN001
LITHIUM 3V
IC001
KEY MI-COM
VDD
RESET Ⓛ
E5DET
POWER SW Ⓛ
LITHIUM EMPTY Ⓛ
POWER LED Ⓛ
WAKE UP Ⓛ
RESET
L3V EMPTY DET.
IC002
Q004
CN006
EVER 5V
E5 DET
RECORDER-KEY 3 C.B.A.
SW1201
POWER
CN1201
POWER SW Ⓛ
POWER LED Ⓛ
POWER LED
CN005
POWER SW Ⓛ
POWER LED Ⓛ
CN006
WAKE UP Ⓛ
CN1607
EVER 5V
E5 DET
SYSCON-SERVO C.B.A.
CN1602
UNREG 6V
IC1603
E5V REG./E5DET
EVER 5V
CN1609
Q1609, 1608
EDIT 6V
EDIT 6V
REG
E5DET
Q1610
Q1605
Q1606
Q1604
DRIVER
IC1602
SS 5V REG.
SS 5V
VR1601
SS 5V
IC1601
MAIN MI-COM
WAKE UP Ⓛ
VDD
RESET Ⓛ
SS ON Ⓛ
PB Ⓗ /EE Ⓛ
AV ON Ⓛ
CN1607
WAKE UP Ⓛ
DRIVER
Q1505
IC1501
DSP 5V REG.
DSP 5V
VR1601
DSP 5V
IC101
SERVO MI-COM
DSP ON Ⓛ
RESET Ⓛ
VDD
BATT.
Q1610
Q1619
CN1604
AV ON Ⓛ
CN1611
UNREG 6V
CN1603
PB Ⓗ /EE Ⓛ
CN1501
UNREG 6V
CN1603
AV ON Ⓛ
CONT.JACK C.B.A.
CN1251
EDIT 6V
CONT.JACK
VIDEO C.B.A.
PB 5V
PB 5V
Q337
Q338
CN205
PB Ⓗ /EE Ⓛ
CN204
UNREG 6V
Q336
DRIVER
VIDEO 5V
CN205
AV ON Ⓛ
CN202
AV ON Ⓛ
UNREG 6V
UNREG 6V
IC301
VIDEO 5V REG.
VR301
VIDEO 5V
CN906
UNREG 6V
Q1001
DRIVER
AUDIO 5V
CN905
AV ON Ⓛ
IC911
AUDIO 5V REG.
AUDIO(1) C.B.A.
EVF C.B.A.
DRIVER
EVF 5V
IC2931
EVF 5V REG.
CW2902
UNREG 6V
AV ON Ⓛ
RECORDER-KEY 1 C.B.A. (2/2)
CN002
AV ON Ⓛ
UNREG 6V
UNREG 6V
CN003
UNREG 6V
AV ON Ⓛ

Fig. I-66

(1) Kinds of power sources

The power voltages for the recorder section are produced using the UNREG 6V supplied from the battery or AC adapter. Also, the LITHIUM 3V power voltage is supplied from the lithium battery as a backup power for the auto date/timer function of KEY microcomputer. Described below are nine power sources provided for the recorder section.

° EVER 5V

When the battery terminal is connected with power supply, the UNREG 6V is converted to the 5V power through the E5V REG circuit (IC1603) mounted on the SS C.B.A. The EVER 5V power is constantly delivered to the internal circuits as long as the power supply is connected.

° SS 5V

When the POWER switch is turned on, the SS ON Ⓛ signal is output from pin 56 of the main microcomputer (IC1601), causing IC1602 to become active. The IC1602 compares the check voltage (determined by VR1601) with the internal reference voltage, and produces the 5V constant-voltage power through control of the output driver (Q1604).

° DSP 5V

Under condition that the DSP operation is allowed (in the CAMERA/PLAY mode), the DSP ON Ⓛ signal is output from pin 27 of the SERVO microcomputer (IC101), causing IC1501 to turn on. The IC1501 compares the check voltage (determined by VR1501) with the internal reference voltage, and produces 5V constant-voltage power through control of the output driver (Q1505).

° VIDEO 5V

The sequence for VIDEO 5V generation is similar to that of SS 5V. The AV ON Ⓛ signal output from pin 55 of the main microcomputer (IC1601) triggers on IC301 to produce the 5V constant-voltage power through control of the output driver (Q336).

° PB 5V

In playback, the PB Ⓗ/EE Ⓛ signal output from pin 22 of the main microcomputer (IC1601) triggers on Q338 and Q337 to generate PB 5V power from VIDEO 5V.

° AUDIO 5V

The AUDIO 5V power is produced on the AUDIO 1 C.B.A. In the same manner as for VIDEO 5V generation, the AV ON Ⓛ signal is used for triggering.

° EVF 5V

The EVF 5V power is produced on the EVF C.B.A. In the same manner as for VIDEO 5V generation, the AV ON Ⓛ signal is used for triggering.

° EDIT 6V

The EDIT 6V power is supplied from the jack equipped on the CONT JACK C.B.A. to the editing equipment/zoom remote controller (ZR-100). Using the SS 5V power for triggering, Q1610, Q1609 and Q1608 are turned on to generate EDIT 6V from UNREG 6V.

° LITHIUM 3V

The LITHIUM 3V power supplied from the lithium battery is used as a backup power for the auto date/timer function of the KEY microcomputer (IC001) when the 6V battery pack is unloaded. With the 6V battery pack loaded, the EVER 5V power is fed to the KEY microcomputer (IC001) through pins 8 and 6 of IC002.

(2) Power-up sequence

° Resetting of main microcomputer on connection of power supply (on loading of main battery pack)

When the battery terminal is connected with the power supply, the EVER 5V power is furnished from pin 1 of IC1603 to the VDD terminals of the KEY microcomputer (IC001) and main microcomputer (IC1601). At this step of sequence, the E5DET signal appearing from pin 4 of IC1603 rises with a lag of approx. 300 ms behind the leading edge of EVER 5V power. During this period, the RESET terminal (pin 7) of the main microcomputer becomes 'Low' for initial resetting. Then, on completion of initialization, the main microcomputer is set to the STANDBY mode. In this mode, it is ready for operation. When the voltage of main battery decreases below 4.5 V (on UNREG 6V line), the E5DET signal goes 'Low'. This resets the main microcomputer to cause shutting-off.

° Resetting of KEY microcomputer on connection of power supply (on loading of main battery pack)

The KEY microcomputer (IC001) is reset in either of the following two events:

(1) When the lithium battery is mounted with the main battery not loaded.
(2) When the main battery is loaded with the lithium battery not mounted.

In either case, the detector circuit in IC002 is made active when the power supply is connected. This causes the 'High' reset pulse is output from pin 2 of IC002. Thereby, the RESET terminal (pin 68) of the KEY microcomputer goes 'Low' for initial resetting.

Then, the KEY microcomputer takes either of the following two sequences according to whether the main battery is loaded or not.

(1) With the main battery not loaded (with the lithium battery mounted):

The E5DET signal appearing at pin 4 of IC1603 becomes 'Low' to turn off Q004. Since the LITHIUM 3V power is fed to pin 37 of the KEY microcomputer, pin 37 goes 'High'. Thereby, the KEY microcomputer knows that the main battery is not loaded, and it enters the SLEEP mode. In this mode, only backup operation for auto date/title display, counter memory, etc. is carried out.

Also, with both the lithium battery mounted, the SLEEP mode is set up in the same sequence when the main battery is removed.

(2) With the main battery loaded:

The E5DET signal appearing at pin 4 of IC1603 becomes 'High' to turn on Q004, causing pin 37 of the KEY microcomputer to go 'Low'. Thereby, the KEY microcomputer recognizes that the main battery is loaded, and it enters the STANDBY mode to get ready for operation.

° At turn-on of POWER switch

On completion of the above resetting sequence, the KEY microcomputer and main microcomputer are put in the STANDBY mode. In this state, pressing the POWER switch applies the 'Low' pulse to pin 43 of the KEY microcomputer. Thus, the KEY microcomputer is made active to output the WAKE UP Ⓛ signal from pin 34. The main microcomputer is then started upon receiving this WAKE UP Ⓛ signal at pin 30. Then, the SS ON Ⓛ and AV ON Ⓛ signals are output to supply main power. When the SS 5V power comes on, it is fed to the VDD terminal (pin 72) of the SERVO microcomputer (IC101). At this step of sequence, since the WAKE UP Ⓛ signal remains 'Low' still, the RESET terminal (pin 32) of the SERVO microcomputer stays 'Low'. Therefore, the SERVO microcomputer is reset before starting its operation.

On completion of the above operational sequence, the WAKE UP Ⓛ signal becomes 'High' to output the POWER LED Ⓛ signal from pin 47 of the KEY microcomputer, causing the POWER LED indicator to light up.

° At turn-off of POWER switch

With the power supply connected, pressing the POWER switch applies the 'Low' pulse to pin 43 of the KEY microcomputer. Thus, the POWER LED Ⓛ signal appearing at pin 47 becomes 'High' to turn off the POWER LED indicator. at the same time, the KEY microcomputer informs the main microcomputer of a power-off event through serial data communication. The main microcomputer then stops the internal mechanisms and shuts main power off.

3-3-3 Pin functions of KEY microcomputer (IC001)

Table I-8 (1/3)

<table>
<tr><th>Pin No.</th><th>Signal designation</th><th>I/O</th><th>Function</th></tr>
<tr><td>1
≀
10</td><td>S12
≀
S21</td><td>O</td><td>LCD segment output.</td></tr>
<tr><td>11
12</td><td>NC</td><td>-</td><td>Open.</td></tr>
<tr><td>13
≀
16</td><td>KEY OUT 0
≀
KEY OUT 3</td><td>O</td><td>Key scan output.</td></tr>
<tr><td>17</td><td>CG1-CS</td><td>O</td><td>Chip select signal for serial data communication with CG1 (IC212).
Serial data communication is carried out while this signal is 'High'.</td></tr>
<tr><td>18</td><td>CG1-STROBE</td><td>O</td><td>Data read-in instruction signal to CG1 (IC212).
On completion of data transfer, this signal goes 'High' to indicate the validity of data.</td></tr>
<tr><td>19</td><td>SHIFT Ⓛ/LOAD Ⓗ</td><td>O</td><td>Parallel-to-serial conversion control signal for audio data.
° When this signal becomes 'High', the 8-bit data input to IC105 is stored into each registor a synchronously with clocking.
° When this signal becomes 'Low', each flip-flop circuit performs sequential shift on the leading edge of clock pulse.</td></tr>
<tr><td>20</td><td>SHIFT-CLOCK</td><td>O</td><td>Shift clock signal used in the parallel-to-serial conversion IC (IC105) for audio data.</td></tr>
<tr><td>21
≀
24</td><td>COM0
≀
COM3</td><td>O</td><td>LCD common lines.</td></tr>
<tr><td>25</td><td>-</td><td>-</td><td>Connected with pin 26 (unused).</td></tr>
<tr><td>26</td><td>-</td><td>-</td><td>Connected with pin 25 (unused).</td></tr>
<tr><td>27</td><td>NC</td><td>-</td><td>Open.</td></tr>
<tr><td>28</td><td></td><td></td><td></td></tr>
<tr><td>29</td><td>ME Ⓗ/ MP Ⓛ</td><td>I</td><td>ME/MP tape check input.
Through detection of the ID hole on cassette, it is checked whether the ME or MP tape is used.
This signal becomes 'High' when the ME tape is used, and it becomes 'Low' when the MP tape is used.</td></tr>
<tr><td>30</td><td>SAFETY TAB Ⓗ</td><td>I</td><td>Used for preventing unintentional erasure.
This signal becomes 'High' when the safety tab of cassette is set to the write-inhibit position.</td></tr>
<tr><td>31
32</td><td>SEL A
SEL B</td><td>I</td><td>Television system identification input.
<table>
<tr><th>Television system
Signal</th><th>JAPAN</th><th>USA</th><th>PAL</th><th>FPAL</th></tr>
<tr><td>SEL A</td><td>H</td><td>H</td><td>L</td><td>L</td></tr>
<tr><td>SEL B</td><td>L</td><td>H</td><td>H</td><td>L</td></tr>
</table></td></tr>
<tr><td>33</td><td>VSS</td><td>-</td><td>Connected with ground.</td></tr>
<tr><td>34</td><td>LITHIUM EMPTY Ⓛ</td><td>I</td><td>This signal goes 'Low' when the terminal voltage of lithium battery decreases below approx. 2.7 V.</td></tr>
<tr><td>35</td><td>HiMP Ⓗ</td><td>I</td><td>HiMP tape identification input.
This signal goes 'High' when the HiMP tape is used (recognized through detection of the ID hole on cassette).</td></tr>
</table>

Table I-8 (2/3)

Pin No.	Signal designation	I/O	Function
36	SERVICE MODE Ⓛ	I	Each 'Low' input changes the service mode in a cyclic manner as indicated below. NORMAL → 1 → 2 → 3 → 4 → 5 → 6 → 7
37	E5DET	I	Used for detection of EVER 5V. This signal checks whether the main battery back is loaded or not, and selects the microcomputer mode accordingly. When the EVER 5 power is present (the main battery pack is loaded), this signal goes 'Low' and sets up the STANDBY mode. When the EVER 5V power is absent (the main battery pack is not loaded), this signal goes 'High' and sets up the SLEEP mode.
38	KEY-CS	I	Chip select signal for serial data communication with the main microcomputer (IC1601). Serial data communication is carried out while this signal is 'High'.
39	S-CLOCK	O	Clock output for serial data communication with the main microcomputer (IC1601) and CG1 (IC212).
40	S-DATA OUT	O	Data output for serial data communication with the main microcomputer (IC1601) and CG1 (IC212).
41	S-DATA IN	I	Data input for serial data communication with the main microcomputer (IC1601).
42	REMOCON DATA	I	This signal indicates input of the data received from the remote controller.
43	POWER SW Ⓛ	I	POWER switch input. When the POWER switch is pressed, this signal goes 'Low'.
44	AUDIO DATA	I	Audio-level serial data input for indication on the audio-level meter.
45	MIC LEV. A/M SW Ⓛ	I	MIC LEV AUTO/MANUAL switch input. When the MIC LEV AUTO/MANUAL switch is pressed, this signal goes 'Low'.
46	TALLY	O	The tally LED indicator turns on when this signal goes 'Low'. In the recording/timer mode, the tally LED indicator blinks at each predetermined cycle. It lights p steadily when the remote control signal is received.
47	POWER LED Ⓛ	O	The POWER LED indicator turns on when this signal goes 'Low'. The POWER LED indicator lights up steadily at power-on, and it blinks on issuance of alarming (low level of battery voltage, moisture condensation, occurrence of fault).
48	WAKE UP	O	Used to start up the main microcomputer (IC1601) and reset the SERVO microcomputer (IC101).
49	C-OUT	O	Timer clock frequency-divided output.
50	KEY IN 0	I	Key matrix input.
51	KEY IN 1		
52	EJECT SW Ⓛ	I	EJECT switch input. When the EJECT switch is pressed, this signal goes 'Low'.
53	STOP SW Ⓛ	I	STOP switch input. When the STOP switch is pressed, this signal goes 'Low'.
54	VDD	I	EVER 5V or LITHIUM 3V power input.
55	XT1	I	Sub-clock oscillation for timer. Connected with the 32.76 KHz crystal oscillator.
56	XT2	O	
57	NC	-	Open.

Table I-8 (3/3)

Pin No.	Signal designation	I/O	Function
58	X1	I	Main clock oscillation. Connected with the 4.19 MHz crystal oscillator.
59	X2	O	
60	TITLE/DATE SW Ⓛ	I	TITLE/DATE switch input. When the TITLE/DATE switch is pressed, this signal goes 'Low'.
61	SHIFT SW Ⓛ	I	SHIFT switch input. When the SHIFT switch is pressed, this signal goes 'Low'.
62	+ SW Ⓛ	I	'+' switch input. When the '+' switch is pressed, this signal goes 'Low'.
63	- SW Ⓛ	I	'-' switch input. When the '-' switch is pressed, this signal goes 'Low'.
64	TIMER SW Ⓛ	I	TIMER switch input. When the TIMER switch is pressed, this signal goes 'Low'.
65	LINE I/O SW Ⓛ	I	LINE switch input. When the LINE switch is pressed, this signal goes 'Low'.
66	Hi8 SW Ⓛ	I	Hi8 switch input. When the Hi8 switch is pressed, this signal goes 'Low'.
67	TRIG. SW Ⓛ	I	TRIGGER switch input. When the TRIGGER switch is pressed, this signal goes 'Low'.
68	RESET Ⓛ	I	Microcomputer reset input. The microcomputer is reset when this signal goes 'Low'.
69 ~ 80	S0 ~ S11	O	LCD segment output.

3-3-4 Pin functions of main microcomputer (IC1601)

Table I-9 (1/3)

<table>
<tr><th>Pin No.</th><th>Signal designation</th><th>I/O</th><th>Function</th></tr>
<tr><td>1</td><td>REC LED. AUTO Ⓗ</td><td>O</td><td>Audio circuit control signal.
This signal goes 'High' when the AUTO mode is selected, and it goes 'Low' when the MANUAL mode is selected.</td></tr>
<tr><td>2</td><td>STEREO Ⓗ/MONO Ⓛ</td><td>O</td><td>Audio circuit control signal. "H" fixed.</td></tr>
<tr><td>3</td><td>DRUM FORWARD Ⓛ</td><td>O</td><td>Forward/backward rotation select signal for drum motor.
This signal goes 'Low' when the drum motor is driven in the forward direction.</td></tr>
<tr><td>4</td><td>NC</td><td>-</td><td>Open.</td></tr>
<tr><td>5
6</td><td>UNLOAD Ⓗ
LOAD Ⓗ</td><td>O</td><td>Loading motor control signal.
<table>
<tr><th>Operation / Signal</th><th>LOAD</th><th>UNLOAD</th><th>BRAKE</th></tr>
<tr><td>UNLOAD Ⓗ</td><td>L</td><td>H</td><td>H</td></tr>
<tr><td>LOAD Ⓗ</td><td>H</td><td>L</td><td>H</td></tr>
</table></td></tr>
<tr><td>7</td><td>RESET Ⓛ</td><td>I</td><td>Microcomputer reset input.
The microcomputer is reset when this signal becomes 'Low'.</td></tr>
</table>

Table I-9 (2/3)

Pin No.	Signal designation	I/O	Function
8	X2	O	Used for crystal oscillation. Connected with the 4.19 MHz crystal oscillator.
9	X1	I	
10 ~ 12	NC	-	Open.
13	Hi8 DET Ⓗ	I	Used for identification of the videotape in playback. This signal goes 'High' when the high-band videotape is used in playback.
14	VIDEO-CS	O	Chip select signal for serial data communication with the VIDEO IC (IC201). Serial data communication is carried out while this signal is 'Low'.
15	CGO-STROBE	O	Data read-in instruction signal to CGO (IC213). On completion of data transfer, this signal goes 'High'.
16	CGO/V-CLOCK	O	Clock output for serial data communication to CGO (IC213) and VIDEO IC (IC201).
17	CGO/V-DATA OUT	O	Data output for serial data communication to CGO (IC213) and VIDEO IC (IC201).
18	SP Ⓗ/LP Ⓛ	O	Rec mode select signal.
19	DISPLAY Ⓛ	O	This signal becomes 'Low' when CGO output is displayed on the monitor (EVF indication).
20	NC	-	Open.
21	Hi8 H /NORMAL Ⓛ	O	High-band/normal-band select signal for the video circuit.
22	PB H /EE Ⓛ	O	PB/EE select signal for the video/audio circuit.
23	JOG H	O	Normal-playback/jog-playback select signal for the video circuit.
24	V-MUTE Ⓗ	O	Video mute signal. This signal goes 'High' for video muting.
25	A-MUTE Ⓗ	O	Audio mute signal. This signal goes 'High' for audio muting.
26	VSS	-	Connected with ground.
27	ACK	I	ACK detection signal input. This signal remains 'High' while the chroma signal is absent in playback.
28 29	- -	-	Connected with ground.
30	WAKE UP Ⓛ	I	Microcomputer start-up signal input. The microcomputer is started up when this signal goes 'Low'.
31 32	- -	-	Connected with ground.
33	DSP KEY 1	I	DSP key input.
34	DSP KEY 2		
35 36	- -	-	Connected with ground.
37	SVSYNC	I	Vertical sync signal input for servo control. Used as a reference signal for vertical synchronization with the SERVO microcomputer (IC101).
38 ~ 40	MODE 3 ~ MODE 1	I	Mode select signal input. This signal, consisting of three bits, is used for detecting the mechanism position.
41	S-DATA IN	I	Data input for serial data communication with the KEY microcomputer (IC001), SERVO microcomputer (IC101), EDIT microcomptuer (IC1604) and CAMERA microcomputer (IC2205).

Table I-9 (3/3)

Pin No.	Signal designation	I/O	Function
42	S-DATA OUT	O	Data output for serial data communication with the KEY microcomputer (IC001), SERVO microcomputer (IC101), EDIT microcomputer (IC1604) and CAMERA microcomputer (IC2205).
43	S-CLOCK	I	Clock input for serial data communication with the KEY microcomputer (IC001), SERVO microcomputer (IC101), EDIT microcomputer (IC1604) and CAMERA microcomputer (IC2205).
44	-	-	Connected with ground.
45	TEST 1	I	Used for function check at the factory.
46	TEST 2		
47	-	-	Connected with SS 5V.
48	EDIT SW ON Ⓛ	I	EDIT switch input. When the EDIT switch is turned on, this signal goes 'Low'.
49	CASSETTE DOWN Ⓛ	I	CASSETTE COMPARTMENT switch input. This signal goes 'Low' when the cassette compartment is set to its down position.
50	REEL FG	I	Supply/takeup reel FG input for winding.
51	EOT SENS. Ⓛ	I	End-of-tape detection input. This signal goes 'Low' when the LED sensor emits light upon detection of the end of videotape.
52	BOT SENS. Ⓛ	I	Beginning-of-tape detection input. This signal goes 'Low' when the LED sensor emits light upon detection of the beginning of videotape.
53	TAPE SENS. LED	O	LED sensor drive pulse for detecting the beginning/end of videotape.
54	CAMERA ON Ⓛ	O	DC/DC converter control signal for the camera circuit. The camera circuit is powered on when this signal goes 'Low'.
55	AV ON Ⓛ	O	Audio/video circuit power control signal. The audio/video circuit is powered on when this signal goes 'Low'.
56	SS ON Ⓛ	O	SYSCON-SERVO circuit power control signal. The SYSCON-SERVO circuit is powered on when this signal goes 'Low'.
57	-	-	Connected with SS 5V.
58	VDD	I	Connected with SS 5V.
59	CAMERA-CS	O	Chip select signal for serial data communication with the CAMERA microcomputer (IC2205). Serial data communication is carried out while this signal is 'High'.
60	EDIT-CS	O	Chip select signal for serial data communication with the EDIT microcomputer 9IC1604). Serial data communication is carried out while this signal is 'High'.
61	SERVO-CS	O	Chip select signal for serial data communication with the SERVO microcomputer (IC1010). Serial data communication is carried out while this signal is 'Low'.
62	KEY-CS	O	Chip select signal for serial data communication with the KEY microcomputer (IC001). Serial data communication is carried out while this signal is 'High'.
63	-	-	Open.
64	CAMERA Ⓗ/LINE Ⓛ	O	Unused.

3-3-5 Pin functions of SERVO microcomputer (IC101)

Table I-10 (1/3)

<table>
<tr><th>Pin No.</th><th>Signal designation</th><th>I/O</th><th>Function</th></tr>
<tr><td>1</td><td>SEL 1</td><td>O</td><td>ATF pilot signal frequency control.
<table>
<tr><td>Pilot frequency
Signal</td><td>f1</td><td>f2</td><td>f3</td><td>f4</td></tr>
<tr><td>SEL 1</td><td>H</td><td>L</td><td>H</td><td>L</td></tr>
<tr><td>SEL 2</td><td>H</td><td>H</td><td>L</td><td>L</td></tr>
</table></td></tr>
<tr><td>2</td><td>HEAD SW PULSE</td><td>O</td><td>Head switching pulse output.</td></tr>
<tr><td>3</td><td>DSP SELECT Ⓗ</td><td>O</td><td>SDP signal select signal for the video circuit.
This signal goes 'Low' when the DSP mode is selected.</td></tr>
<tr><td>4</td><td>TS A</td><td>O</td><td>ATF error sample/hold pulse
This signal goes 'High' for sampling, and its goes 'Low' for holding.</td></tr>
<tr><td>5
6</td><td>NC</td><td>-</td><td>Open.</td></tr>
<tr><td>7</td><td>SLOW TIMING</td><td>O</td><td>Slow shutter speed timing pulse.</td></tr>
<tr><td>8</td><td>ATF ADJ. Ⓗ</td><td>O</td><td>Used for ATF adjustment.
This 'High' pulse output is used to offset the external ATF circuit for ATF adjustment conducted by the microcomputer.</td></tr>
<tr><td>9</td><td>SVSYNC</td><td>O</td><td>Vertical sync signal output for servo control.
This signal is used as a reference signal for vertical synchronization with the main microcomputer (IC1601).</td></tr>
<tr><td>10</td><td>NC</td><td>-</td><td>Open.</td></tr>
<tr><td>11</td><td>REEL FG</td><td>O</td><td>Supply/takeup reel FG output for winding.</td></tr>
<tr><td>12</td><td>CAPSTAN TORQUE Ⓗ</td><td>O</td><td>Capstan torque increase control signal.
This signal goes 'High' when increasing torque of the capstan.</td></tr>
<tr><td>13</td><td>CAPSTAN FWD Ⓗ</td><td>O</td><td>Capstan rotating direction control signal.
This signal goes 'High' for forward rotation of the capstan, and it goes 'Low' for its reserve rotation.</td></tr>
<tr><td>14</td><td>CAPSTAN ON Ⓗ</td><td>O</td><td>Capstan on/off control signal.
This signal goes 'High' for turning on the capstan motor.</td></tr>
<tr><td>15</td><td>DSP-CS</td><td>O</td><td>Chip select signal for serial data communication to the DSP gate array (IC1506).</td></tr>
<tr><td>16
17</td><td>NC</td><td>-</td><td>Open.</td></tr>
<tr><td>18</td><td>JOG VD</td><td>O</td><td>Pseudo VD output in jog playback.</td></tr>
<tr><td>19
≀
22</td><td>RCH OUT 3
≀
RCH OUT 0</td><td>O</td><td>Parallel output (4 bits) for right-channel audio level.</td></tr>
<tr><td>23
≀
26</td><td>LCH OUT 3
≀
LCH OUT 0</td><td>O</td><td>Parallel output (4 bits) for left-channel audio level.</td></tr>
<tr><td>27</td><td>DSP ON Ⓛ</td><td>O</td><td>DSP 5V control signal.
DSP 5V comes on when this signal goes 'Low'.</td></tr>
<tr><td>28

30</td><td>NC</td><td>-</td><td>Open.</td></tr>
<tr><td>31</td><td>-</td><td>-</td><td>Connected with ground.</td></tr>
<tr><td>32</td><td>RESET Ⓛ</td><td>I</td><td>Microcomputer reset input.
The microcomputer is reset when this signal goes 'Low'.</td></tr>
<tr><td>33</td><td>VSS</td><td>-</td><td>Connected with ground.</td></tr>
</table>

Table I-10 (2/3)

Pin No.	Signal designation	I/O	Function
34	X OUT	O	Used for crystal oscillation.
35	X IN	I	Connected with the 8 MHz crystal oscillator.
36	SERVO-CS	I	Chip select signal for serial data communication with the main microcomputer (IC1601). Serial data communication is carried out while this signal is 'Low'.
37	S-DATA IN	I	Data input for serial data communication with the main micro-comptuer (IC1601).
38	S-DATA OUT	O	Data output for serial data communication with the main micro-computer (IC1601).
39	S-CLOCK	O	Clock output for serial data communication with the main microcomptuer (IC1601).
40	-	-	Connected with SS 5V.
41	FRAME REF.	I	Frame reference signal from the DSP gate array (IC1506). Used as an ID signal to set 313H for reading into the field memory.
42	DSP-DATA OUT	O	Data output for serial data communication to the DSP gate array (IC1506).
43	DSP-CLOCK OUT	O	Clock output for serial data communication to the DSP gate array (IC1506).
44	DEW SENSOR	I	Dew sensor input. On occurrence of moisture condensation, the dew sensor increases its resistance. Thereby, the analog input voltage indicating dew condition is increased.
45	BATT. ADJ.	I	Used for adjustment of the lower-limit level of main battery.
46	T-REEL FG	I	Takeup reel FG input.
47	S-REEL FG	I	Supply reel FG input.
48	LCH LEVEL	I	Left-channel audio input.
49	RCH LEVEL	I	Right-channel audio input.
50	SW POINT ADJ.	I	Used for switching point adjustment.
51	ATF ERROR	I	ATF error input.
52	AVSS	-	Connected with ground.
53	AVREF	I	Connected with SS 5V.
54	AVDD		
55	-	-	
56	D-FG	I	Drum FG input.
57	ATF LOCK Ⓛ	I	This signal goes 'Low' when the ATF servo phase is locked normally in playback.
58	COMP. SYNC	I	Composite sync input.
59	DSP V-REF	I	Vertical sync signal from the DSP gate array (IC1506).
60	D-PG	I	Drum PG input. (Unused in the inside; pin 56 assigned)
61	D-FG	I	Drum FG input.
62	C-FG	I	Capstan FG input.
63 ~ 66	NC	-	Open.
67	D-PWM	O	Drum motor drive signal.
68	C-PWM	O	Capstan motor drive signal.
69	C-FG	I	Capstan FG input. (Unused in the inside; pin 62 assigned)

Table I-10 (3/3)

Pin No.	Signal designation	I/O	Function
70	SHIFT Ⓗ/LOAD Ⓛ	I	Parallel-to-serial conversion control signal for audio data. Refer to the description of 'KEY microcomputer (IC001) - pin 19'.
71	-	-	Connected with SS 5V.
72	VDD	I	
73	VSS	-	Connected with ground.
74	-	-	Connected with SS 5V.
75	REC Ⓗ	O	Recording amplifier control signal. This signal goes 'High' when the REC mode is selected.
76	FE ON Ⓗ	O	FE head oscillation control signal. This signal goes 'High' for erasure of videotape.
77	CH-1' H-SW-PULSE	O	CH1/CH-1' switching pulse in the slow-motion, still, or frame advance playback operation.
78	TS B	O	ATF lock sample/hold pluse. This signal goes 'High' for sampling, and it goes 'Low' for holding.
79	ATF SW	O	ATF BPF changeover signal. This signal goes 'Low' when an ATF error is detected on f1/f3 track, and it goes 'High' when an ATF error is detected on f2/f4 track.
80	SEL 2	O	Refer to the description of pin 1 (SEL 1).

3-3-6 Data communication

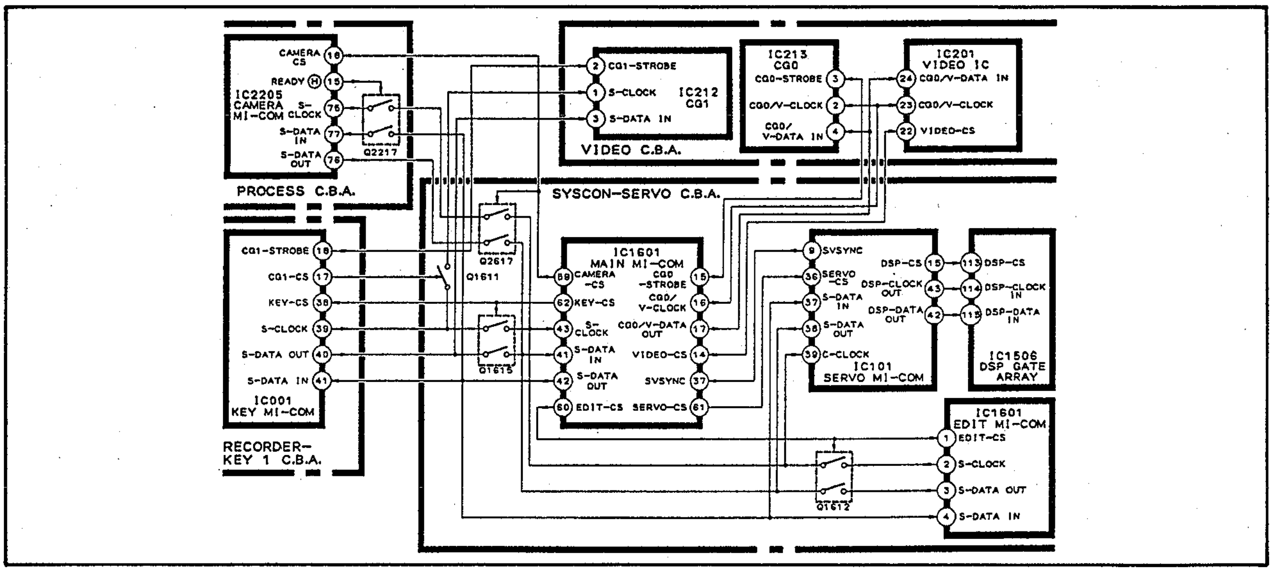

CAMERA CS 16
READY H 15
IC2205 CAMERA MI-COM
S-CLOCK 75
S-DATA IN 77
S-DATA OUT 76
Q2217
PROCESS C.B.A.
2 CG1-STROBE
1 S-CLOCK
3 S-DATA IN
IC212 CG1
VIDEO C.B.A.
IC213 CG0
CG0-STROBE 3
CG0/V-CLOCK 2
CG0/V-DATA IN 4
IC201 VIDEO IC
24 CG0/V-DATA IN
23 CG0/V-CLOCK
22 VIDEO-CS
SYSCON-SERVO C.B.A.
CG1-STROBE 16
CG1-CS 17
KEY-CS 38
S-CLOCK 39
S-DATA OUT 40
S-DATA IN 41
IC001 KEY MI-COM
RECORDER-KEY 1 C.B.A.
Q2617
Q1611
Q1615
IC1601 MAIN MI-COM
59 CAMERA-CS
62 KEY-CS
43 S-CLOCK
41 S-DATA IN
42 S-DATA OUT
60 EDIT-CS
CG0-STROBE 15
CG0/V-CLOCK 16
CG0/V-DATA OUT 17
VIDEO-CS 14
SVSYNC 37
SERVO-CS 61
9 SVSYNC
36 SERVO-CS
37 S-DATA IN
38 S-DATA OUT
39 C-CLOCK
IC101 SERVO MI-COM
DSP-CS 15
DSP-CLOCK OUT 43
DSP-DATA OUT 42
113 DSP-CS
114 DSP-CLOCK IN
115 DSP-DATA IN
IC1506 DSP GATE ARRAY
IC1601 EDIT MI-COM
1 EDIT-CS
2 S-CLOCK
3 S-DATA OUT
4 S-DATA IN
Q1612

Fig. I-67

In this camcorder, the following two serial data communications are carried out:

1) Bidirectional communication between the main microcomputer and the CAMERA/KEY/EDIT/SERVO microcomputer.
2) Unidirectional communication from the KEY microcomputer to the CGI IC, from the main microcomputer to the CGO IC/VIDEO IC, and from the servo microcomputer to the DSP gate array.

° Bidirectional communication between the main microcomputer and the CAMERA/KEY/EDIT/SERVO microcomputer

Communication control is totally conducted by the CS (CHIP SELECT) signal issued from the main microcomputer. The amount of data interchanged in communication is as follows:

Between main and CAMERA microcomputers ..... 8 bits x 4
Between main and KEY microcomputers .... 8 bits x 8
Between main and EDIT microcomputers .... 8 bits x 4
Between main and SERVO microcomputers ...... 8 bits x 7

The key input signal, camcorder mode signal, mechanism check switch signal, and other data signals are interchanged in communication.

When communication with the KEY microcomputer is required, the main microcomputer sets the KEY-CS signal at pin 62 (IC1601) to 'High' level for indicating a communication request to the KEY microcomputer. It also establishes a communication link by turning on Q1615. Then, the KEY microcomputer sends the S-CLOCK signal (from pin 39) and the S-DATA signal (from pin 40) to the main microcomputer. When the main microcomputer receives the S-DATA signal (at pin 41), it initiates bidirectional serial data communication.

In the same fashion, the main microcomputer outputs the CAMERA-CS signal (from pin 59), the EDIT-CS signal (from pin 60) and the SERVO-CS signal (from pin 61) to the CAMERA, EDIT and SERVO microcomputers respectively to initiate serial data communication.

Receiving the SVSYNC signal from pin 9 of the SERVO microcomputer, the main microcomputer provides vertical synchronization and controls chip selection so that communication with the microcomputer is carried out once per vertical interval while preventing an overlap of vertical intervals. The S-DATA OUT signal appearing at pin 42 of the main microcomputer contains data to be sent to each of other microcomputers, but only while the CS signal is output, each of them recognizes that the data is valid.

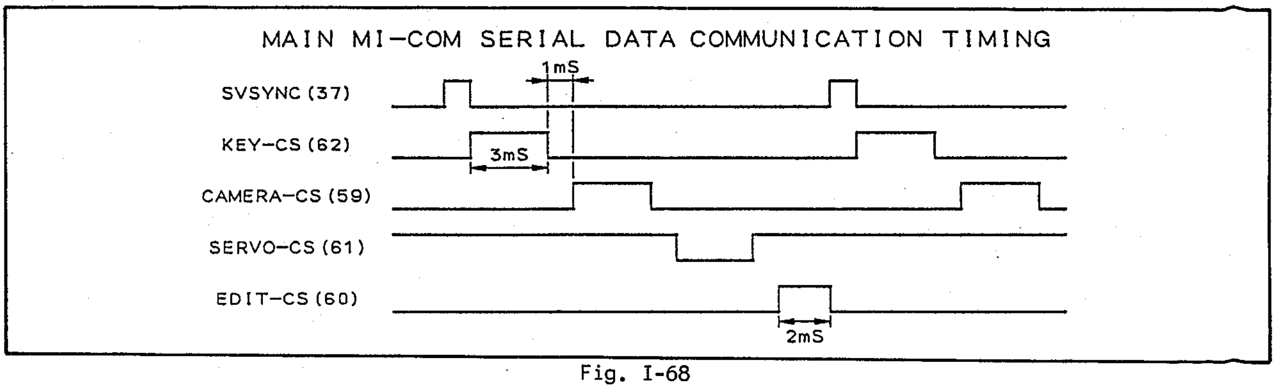

MAIN MI-COM SERIAL DATA COMMUNICATION TIMING
1mS
SVSYNC (37)
KEY-CS (62)
3mS
CAMERA-CS (59)
SERVO-CS (61)
EDIT-CS (60)
2mS

Fig. I-68

° Unidirectional communication from the KEY microcomputer to the CGI

The title/date display character data is transferred from the KEY microcomputer to the CGI. More specifically, the character data is input from pin 40 of the KEY microcomputer to the CGI on an 8-bit basis serially. The S-CLOCK signal, used for read-in clocking, is passed through Q1611 and applied to the CGI only while the CGI-CS signal (from pin 17) is 'High'. Upon receiving the CGI-STROBE signal after input of the 8-bit serial data, the CGI recognizes that the relevant data is valid for reading.

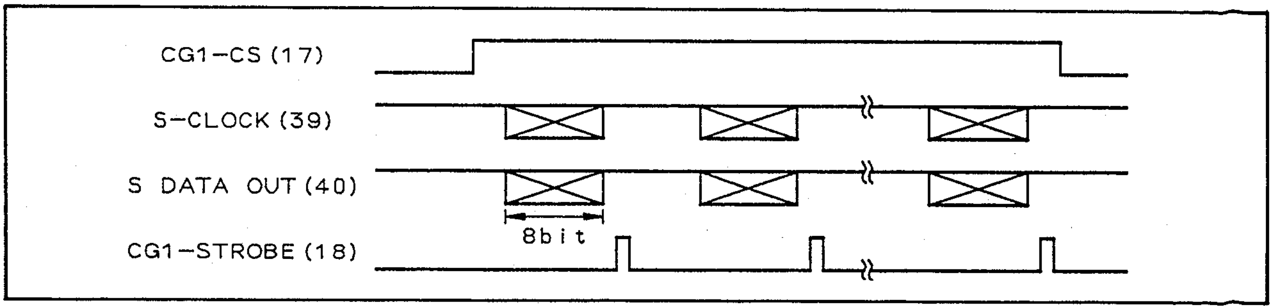

CG1-CS (17)
S-CLOCK (39)
S DATA OUT (40)
8bit
CG1-STROBE (18)

Fig. I-69

° Unidirectional communication from the main microcomputer to the CGO/
Unidirectional communication from the main microcomputer to the VIDEO IC

The main microcomputer transfers the viewfinder display character data to the CGO, and it also transfers the mode changeover data (Hi8, NORM, PB, REC, etc.) and character setup data to the VIDEO IC. More specifically, the data is input from pin 17 of the main microcomputer to each of these two ICs. The validity of data is indicated using the CGO-STROBE signal (from pin 15) and the VIDEO-CS signal (from pin 14). That is, in data transfer to the CGO, the CGO-STROBE signal is given to the CGO after input of the 8-bit serial data (in the same manner as for communication from the KEY microcomptuer to the CGI). Thus, the CGO recognizes that the relevant data is valid for reading. In data transfer to the VIDEO IC, while the VIDEO-CS signal remains 'Low', the VIDEO IC recognizes that 19 bits of 24-bit data are valid for reading.

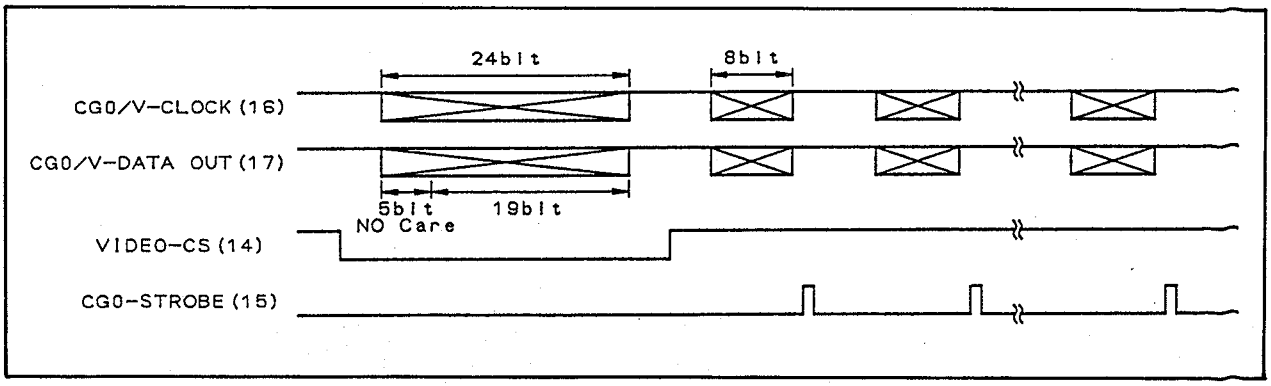

24bit
8bit
CGO/V-CLOCK (16)
CGO/V-DATA OUT (17)
5bit
19bit
NO Care
VIDEO-CS (14)
CGO-STROBE (15)

Fig. I-70

° Unidirectional communication from the SERVO microcomputer to the DSP gate array

The DSP gate array (IC1506), which serves as a kernel circuit for digital signal processing, is controlled under direction of the SERVO microcomputer. That is, the control data for each DSP operation mode is transferred from the SERVO microcomputer to the DSP gate array. While the DSP-CS signal (from pin 15) is 'Low', 24 bits (8 bits x 3) of control data are read in with timing of the DSP-CLOCK signal (from pin 43).

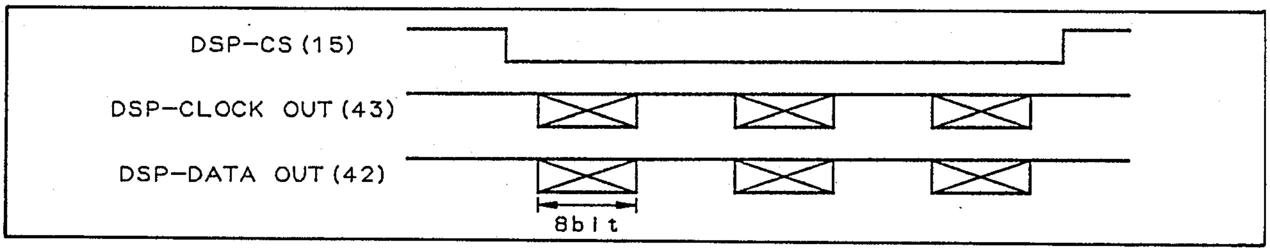


Fig. I-71

3-3-7 Safety functions

To prevent a physical damage or jamming of tape due to improper setting, this camcorder carries out the warning indication processing, key-input rejection, or operational restriction as mentioned below.

(1) Detection of decrease in battery voltage

The separate detection circuits are provided for checking the low levels of main and lithium batteries.

° Detection of decrease in main battery voltage

The following three levels of main battery are detectable during operation.

(UNDER CUT 1)
When the voltage level at main battery terminal decreases below 5.65 V, the POWER LED indicator flashes and the 'BATT' warning message blinks on the viewfinder screen. Under this condition, the key input and operation are not restricted (the normal operation can be continued).
Note, however, that only the POWER and EJECT keys are acceptable after the camcorder is stopped once.
If the UNREG 6V power decreases below the predetermined allowable voltage level, the low voltage detecting level at pin 45 of the SERVO microcomputer decreases also and the UNDER CUT 1 state is recognized in the microcomputer. Knowing this state, the SERVO microcomputer informs the main microcomputer and KEY microcomputer (via main microcomputer) of it through serial data communication. Then, the main microcomputer indicates the warning on the viewfinder screen with the CGO/V-DATA OUT signal from pin 17, and the KEY microcomputer flashes the POWER LED indicator (from pin 47) and blinks 'BATT' on the LCD.

(UNDER CUT 2)
If the UNREG 6V power further decreases below 5.45 V, the power-off state is taken automatically through the stop state.
In the same manner as for the UNDER CUT 1, the low voltage detecting level at pin 45 of the SERVO microcomputer is detected in the microcomputer. Thus, upon detection of the low voltage level of less than 5.45 V, the microcomputer stops the mechanisms and turns the power off.

(SHUT-OFF)
If the main battery voltage drops rapidly below 4.5 V, the RESET IC (IC1603) makes the E5DET signal (from pin 4) 'Low' to apply the RESET Ⓛ signal to pin 7 of the main microcomputer (IC1601). Thereby, the main microcomputer is reset to shut the power off immediately.

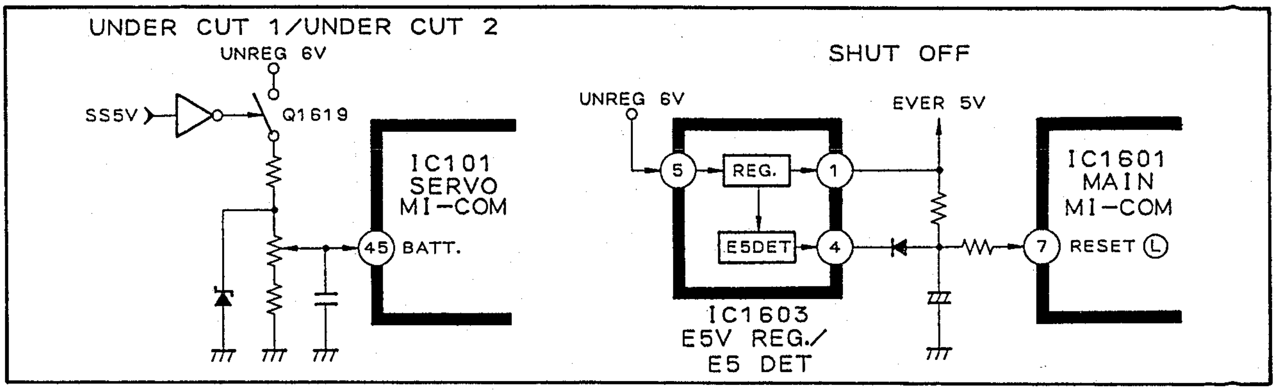

UNDER CUT 1/UNDER CUT 2
UNREG 6V
SS5V
Q1619
IC101
SERVO
MI-COM
45
BATT.
SHUT OFF
UNREG 6V
EVER 5V
5
REG.
1
E5DET
4
IC1603
E5V REG./
E5 DET
IC1601
MAIN
MI-COM
7
RESET Ⓛ

Fig. I-72

° Detection of decrease in lithium battery voltage

If the voltage level at lithium battery terminal decreases below approx. 2.7 V, pin 3 of IC002 goes 'Low' to let the KEY microcomputer know the low voltage level of lithium battery. Knowing this condition, the KEY microcomputer informs the main microcomputer of it through serial data communication. Then, the main microcomputer blinks 'DATE BATT' on the viewfinder screen with the CGO-V-DATA OUT signal from pin 17.

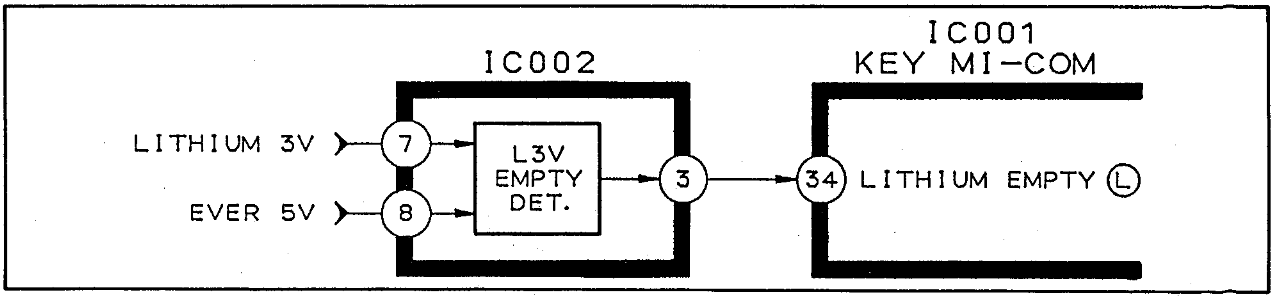

IC002
IC001
KEY MI-COM
LITHIUM 3V
EVER 5V
7
8
L3V
EMPTY
DET.
3
34
LITHIUM EMPTY Ⓛ

Fig. I-73

(2) Dew condensation

The dew (moisture condensation) detecting function is provided to circumvent jamming of tape due to possible sticking.

If moisture condensation is detected during operation, the mechanism is put in the stop state and the POWER LED indicator flashes for warning. Also, 'd' and 'DEW' blink on the LCD and the viewfinder screen respectively to let the user know detection of moisture condensation. Under this condition, other keys than the POWER and EJECT keys become ineffective. Even if the tape cassette is inserted, its loading sequence is not carried out. After 'dew' condition is removed, the camcorder sets up the stop mode to get ready for normal operation.

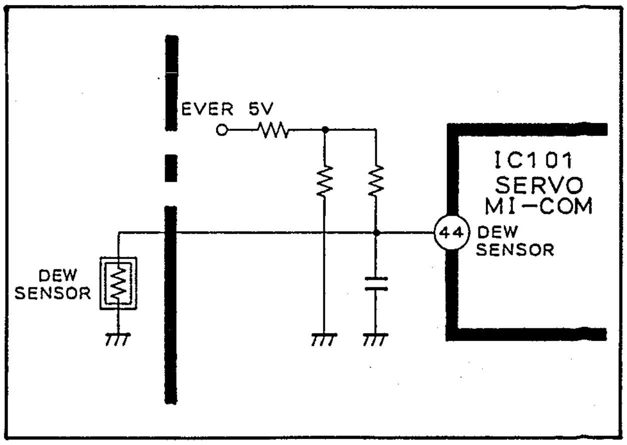

EVER 5V
DEW
SENSOR
IC101
SERVO
MI-COM
44
DEW
SENSOR

Fig. I-74

When the camcorder is under 'dew' condition, the DEW sensor equipped on the mechanical chassis increases its resistance to increase the DEW detection voltage input to pin 44 of the SERVO microcomputer. If the level of this voltage rises above the predetermined value, the microcomputer judges that dew condensation has occurred. Then, the microcomputer carries out the mode transition and provides the warning indication.

(DEW EJECT)

If the videotape sticks to the drum, it cannot be run only with the takeup reel. In this event, the supply reel must be used also. Upon detection of dew condensation, the 'DEW EJECT' sequence is carried out as indicated below.

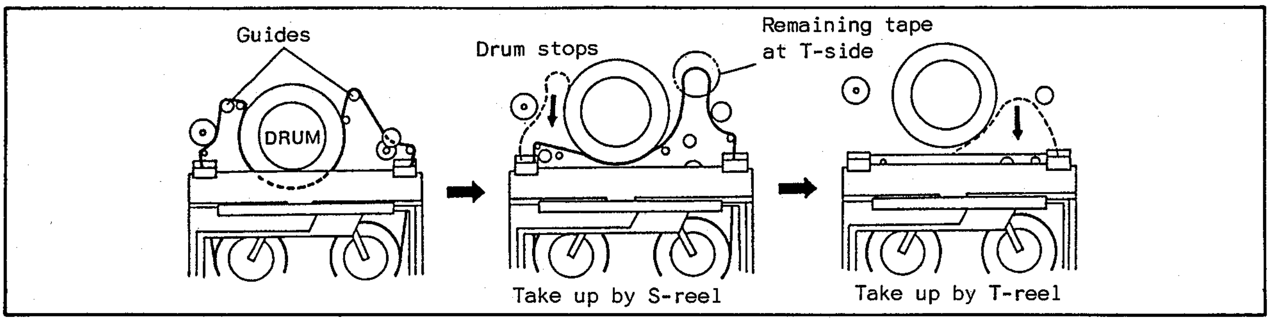

Guides
DRUM
Drum stops
Remaining tape at T-side
Take up by S-reel
Take up by T-reel

Fig. I-75

(3) End-of-tape check

If the videotape is run up to its end, the tape guide may be damaged or the head drum may be squeezed with the tape. To prevent such an event, the end-of-tape check is conducted to detect the end of tape during operation. Upon detection of the end of tape, the tape is stopped immediately.

The end-of-tape detecting LED is turned on/off with the TAPE SENS LED signal appearing at pin 53 of the main microcomputer. It constantly flashes for one msec per 17 msec. If the signal across pins 51 and 52 goes 'Low' twice in succession, the microcomputer recognizes the end of tape and applies reverse-rotation braking to the capstan motor to stop the mechanism.

Also, if the EOT and BOT input signals go 'Low' twice in succession, the microcomputer judges that the cassette is not loaded. In this case, 'CASSETTE' blinks on the viewfinder screen.

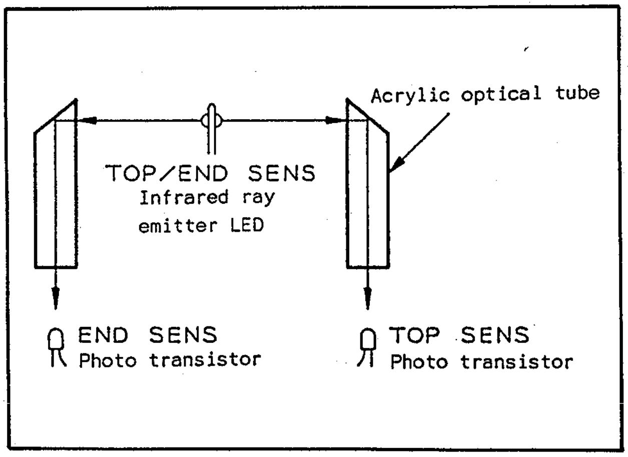

Acrylic optical tube
TOP/END SENS
Infrared ray
emitter LED
END SENS
Photo transistor
TOP SENS
Photo transistor

Fig. I-76

(4) Pause timer

In the REC PAUSE or STILL mode, the head drum rotates with the tape wound around it. If this condition persists for a certain period of time, the tape may wear or the head may be contaminated with magnetic oxides. To prevent this, if the REC PAUSE state is kept for seven minutes, it is automatically changed over to the STOP mode and the power is turned off. Also, if the STILL mode is kept for seven minutes, it is automatically changed over to the STOP mode with the power being turned on.

(5) Trouble stop (error)

The error detection sequence is carried out by the main microcomputer (IC1601) and the SERVO microcomputer (IC101). Upon detection of an error, the mechanism is forced to stop.
In this state, only the POWER and EJECT keys are acceptable. Note, however, that these keys may also be ineffective on occurrence of a certain kind of error.

In the event of trouble, the POWER LED indicator flashes, 'EJECT' blinks on the viewfinder screen and also 'EJECT' blinks on the LCD for warning.

Event	State	Detection
Drum error	1. Error detection mode : At startup/during operation 2. Frequency during operation: 720 Hz 3. Error detection level At startup : 240 Hz or less During operation : 200 Hz or less 4. Error detection time At startup : An error is indicated if the detection level does not exceed 100 msec within a period of 5 msec after issuance of the startup instruction. During operation : 100 msec or more	SERVO MI-COM IC101-61/ D-FG
Capstan error	1. Error detection mode : Detected only at startup of the capstan in unloading. 2. Error detection level : 40% or less of the rated rotating speed. 3. Error detection time : If 40% or less of the rated rotating speed is exceeded at least once within a period of 2 sec after issuance of the startup instruction.	SERVO MI-COM IC101-62, 69/ C-FG
Reel error	1. Error detection mode : Each mode in which the reel is rotated. 2. Error detection level and detection time: Under condition that the rated rotating speed in each mode is 'n' with respect to the maximum diameter of tape winding: PLAY, REC, FF SEARCH, FR SEARCH } An error is indicated if 'n x 1/2' is reached. FF/REW } An error is indicated if 'n x 1/5' is reached. UNLOAD } An error is indicated if no change found during one sec.	MAIN MI-COM IC1601-50/ REEL FG
Loading error	An error is indicated if the mode selection data remains unchanged for the predetermined period of time. Mode transition between EJECT and UNLOAD ..... 2 msec Mode transition between UNLOAD and STOP ...... 8 msec Mode transition between STOP and PINCH ON .... 2 msec	MAIN MI-COM IC1601-38∿40/ MODE 1∿3

Fig. I-77

(6) Full-top loading

To prevent the beginning of tape from getting onto the drum edge in loading, the following special sequence is performed upon detection of the beginning of tape after the cassette is inserted.

The takeup reel tenses the tape first, and then the drum motor is run in reverse slightly for approx. one second. This causes the claw on the upper drum to push the tape away to the edge of drum. And, reverse-rotation braking is applied to the drum motor to wind the tape on the takeup reel again. Thereafter, the normal loading sequence is carried out.

3-3-8 Servo circuit

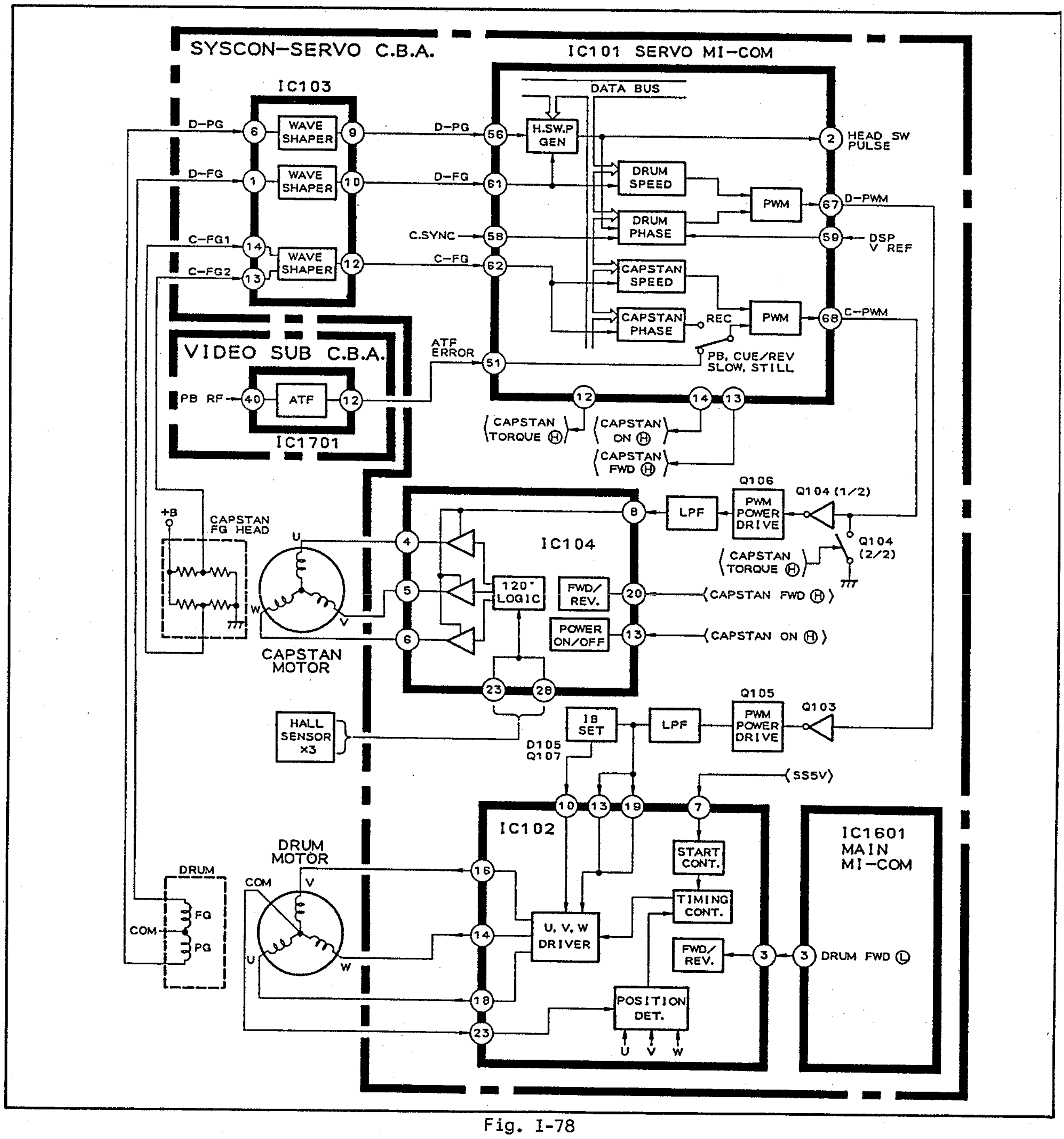

SYSCON–SERVO C.B.A.
IC101 SERVO MI–COM
IC103
DATA BUS
D–PG
D–FG
C–FG1
C–FG2
WAVE SHAPER
H.SW.P GEN
DRUM SPEED
DRUM PHASE
CAPSTAN SPEED
CAPSTAN PHASE
PWM
C.SYNC
ATF ERROR
HEAD SW PULSE
D–PWM
DSP V REF
C–PWM
REC
PB, CUE/REV SLOW, STILL
VIDEO SUB C.B.A.
PB RF
ATF
IC1701
CAPSTAN TORQUE Ⓗ
CAPSTAN ON Ⓗ
CAPSTAN FWD Ⓗ
Q106
Q104 (1/2)
Q104 (2/2)
LPF
PWM POWER DRIVE
+B
CAPSTAN FG HEAD
U
V
W
CAPSTAN MOTOR
IC104
120° LOGIC
FWD/ REV.
POWER ON/OFF
HALL SENSOR ×3
IB SET
D105
Q107
Q105
Q103
SS5V
DRUM MOTOR
DRUM
COM
FG
PG
IC102
START CONT.
TIMING CONT.
U, V, W DRIVER
FWD/ REV.
POSITION DET.
IC1601 MAIN MI–COM
DRUM FWD Ⓛ

Fig. I-78

The drum and capstan servoloops are controlled principally under direction of the SERVO microcomputer (IC101) mounted on the SS C.B.A.

(1) Drum servocontrol

The minuscule outputs from the FG and PG coils equipped on the drum motor are subjected to waveform shaping in IC103 to provide logical levels (0 to 5 V). Then, the logical-level signals are input to the SERVO microcomputer. Under the normal operation (recording/playback), the D-FG signal as a frequency of 720 Hz. Using these signals, the SERVO microcomputer carries out the speed servocontrol and the phase servocontrol to output the D-PWM signal from pin 67.

The D-PWM output signal is subjected to power driving by Q105 and converted to DC voltage through the low-pass filter. The converted DC voltage is applied to pins 13 and 19 of the drum motor driver (IC102). According to the level of this drive voltage, the voltage applied to the winding of three-phase motor is changed to control the rotating speed of drum. The IB SET block equipped at the location of pin 10 is used for reducing electromagnetic noise generated by the drum motor, and internal correction is made for variation in the level of drive voltage (at pins 13 and 14).

The switch timing control of the three-phase motor is conducted through detection of a counter e.m.f. voltage produced from each winding. The D-PWM signal mentioned above is used to start up the motor. For forward/reverse rotation control, the DRUM FWD Ⓛ signal output from the main microcomputer is used.

(2) Capstan servocontrol

The FG1 signal from the capstan motor and the FG2 signal having the reverse phase are subjected to waveform shaping by IC103. Then, these signal are frequency-multiplied (doubled) respectively to provide logical-level inputs to the SERVO microcomputer. In recording, the frequency is 948 Hs. On receipt of these input signals, the SERVO microcomputer carries out speed servocontrol and phase servocontrol. In playback, the ATF ERROR signal input to pin 51 is used to conduct phase servocontrol. As in the drum servocontrol sequence, the C-PWM signal (result of servocontrol) is output from pin 68 and then subjected to power driving with Q106. Then, after passing through the low-pass filter, the DC voltage is input to pin 8 of the capstan motor drive (IC104) and applied for driving in each of motor phases U, V and W.

For the U/V/W switching of motor, the three Hall-effect elements are used to detect the rotor position. Thus, the switching operation is controlled.

Starting of the motor is controlled by the CAPSTAN ON Ⓗ signal from the main microcomputer. Alsok when reverse-rotation braking is applied on detection of the beginning/end of tape, the SERVO microcomputer outputs the CAPSTAN TORQUE Ⓗ signal to turn on Q104 for increasing the drive voltage to its maximum level. In this sequence, the SERVO microcomputer also sets the CAPSTAN FWD Ⓗ to 'Low' level.

3-4 Video circuit

The video circuit of this model uses the same IC (IC201, 202) as the E800Hi. The switching SW at DSP motion by DSP function, and video output IC are newly equipped.

(1) Recording system

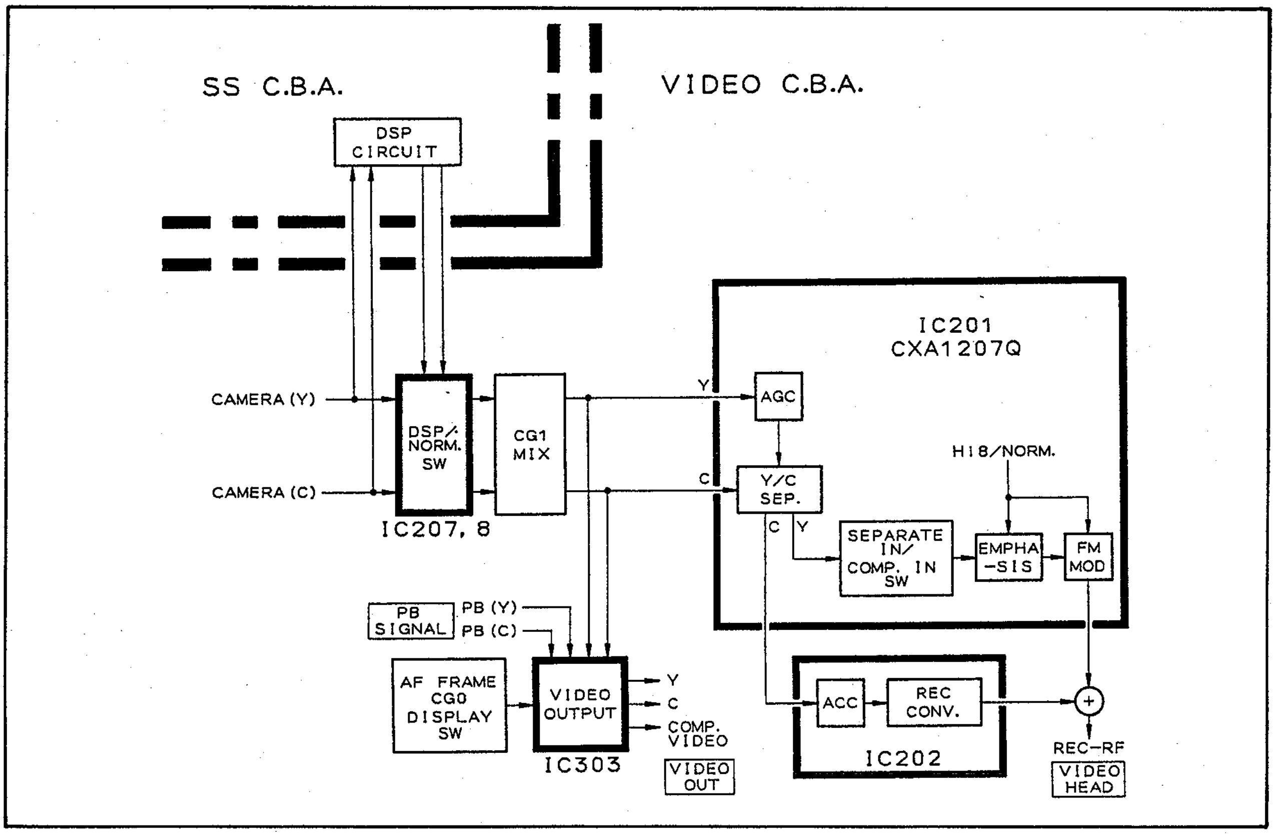

SS C.B.A.
VIDEO C.B.A.
DSP CIRCUIT
CAMERA (Y)
CAMERA (C)
DSP/NORM. SW
IC207, 8
CG1 MIX
Y
C
IC201
CXA1207Q
AGC
Y/C SEP.
C
Y
H18/NORM.
SEPARATE IN/ COMP. IN SW
EMPHA-SIS
FM MOD
PB SIGNAL
PB (Y)
PB (C)
AF FRAME CGO DISPLAY SW
VIDEO OUTPUT
IC303
Y
C
COMP. VIDEO
VIDEO OUT
ACC
REC CONV.
IC202
+
REC-RF
VIDEO HEAD

Fig. I-79

The Y, C signals input from camera latch are divided into the signal which proceeds to DSP circuit and the signal which proceed to recording circuit, and, in the next step, DSP mode signal or normal mode signal is selected by DSP/NORM switching SW. The selected signals are mixed with CG1 (tile, date character), and divided into video output group and recording group.

The signals on video output side are mixed with CGO (mode counter) at video output (only at display option mode), output from video, S-terminals.

The recording signals passes AGC circuit. The Y signal, after FM demodulation, is mixed with chroma-modulated base signal, and recorded.

C signal passes the same Y/C separation circuit as composite input, and, after the ACC, is low-frequency modulated and then recorded.

1) Luminance signal system

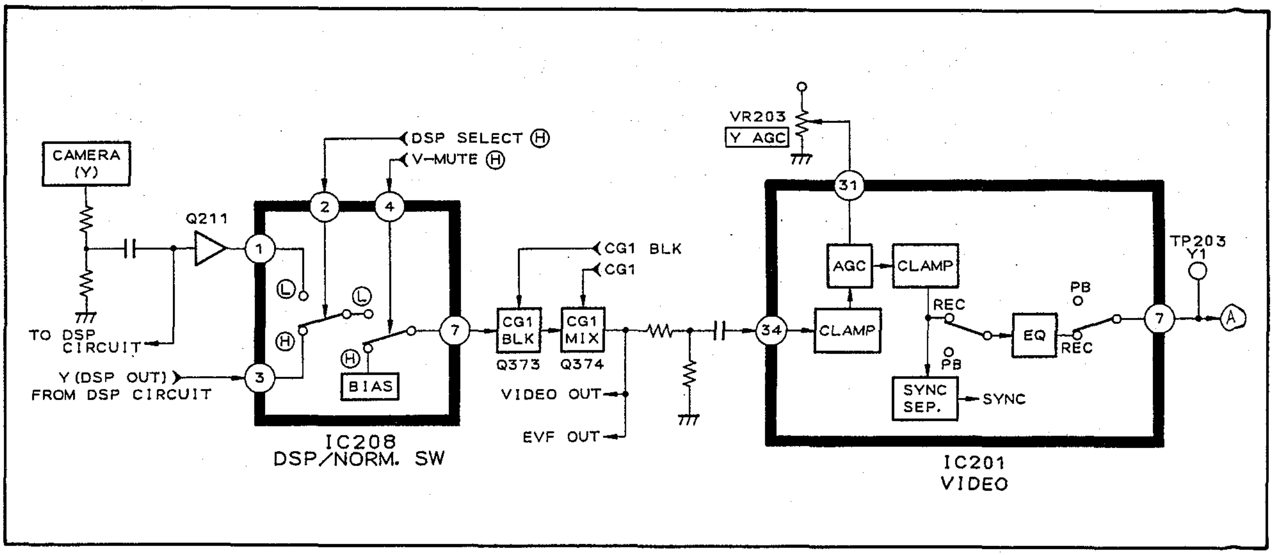

CAMERA (Y)
Q211
TO DSP CIRCUIT
Y (DSP OUT) FROM DSP CIRCUIT
DSP SELECT Ⓗ
V-MUTE Ⓗ
1
2
3
4
7
Ⓛ
Ⓗ
BIAS
IC208
DSP/NORM. SW
CG1 BLK
CG1
CG1 BLK
CG1 MIX
Q373
Q374
VIDEO OUT
EVF OUT
VR203
Y AGC
31
34
AGC
CLAMP
CLAMP
REC
PB
EQ
SYNC SEP.
SYNC
TP203 Y1
Ⓐ
IC201
VIDEO

Fig. I-80

Y signal input from camera (1 Vp-p) is, after input, reduced to 0.5 Vp-p by a resistor. Then, it is amplified to 1.1 Vp-p by Q211, passes swithing SW (IC208) between Y signal of DSP, and mixed with CG1 (date, title) signal. (extract the signal with CG1 BLK, then mix the CG1, to make a trimmed character)

The signal after CG1 mixing, reduced to 0.5 Vp-p by a resistor, and is input to IC201.

Signal is matched with 0.5 Vp-p by AGC.

The AGC signal, after clamped passes the REC/PB SW, and diversifies into the Y/C separation input luminance signal passes an equalizer circuit, then is fed to, and is output from pin 7 of IC201.

Remarks: The signal amplitude voltage (Vp-p) is the value counted at 100% signal input time.

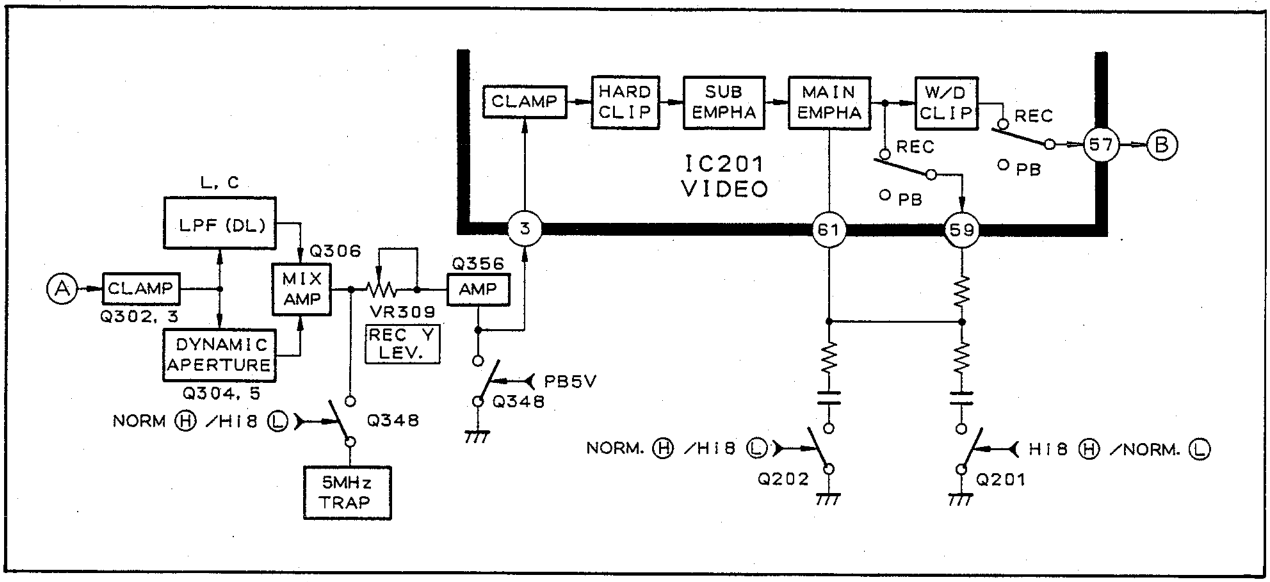

CLAMP
HARD CLIP
SUB EMPHA
MAIN EMPHA
W/D CLIP
REC
PB
REC
PB
57
B
IC201 VIDEO
3
61
59
L, C
LPF (DL)
Q306
MIX AMP
Q356
AMP
A
CLAMP
Q302, 3
VR309
REC Y LEV.
DYNAMIC APERTURE
Q304, 5
PB5V
Q348
NORM Ⓗ /Hi8 Ⓛ
Q348
5MHz TRAP
NORM. Ⓗ /Hi8 Ⓛ
Q202
Hi8 Ⓗ /NORM. Ⓛ
Q201

Fig. I-81

The luminance signal output from pin 7 of IC201 is subjected to correction of dynamic aperture after clamping. (The luminance signal passes LPF for time matching with an aperture signal prepared by differentiation, and mixed with aperture signal in Q306.)

Next, it passes the 5 MHz trap which turned off at Hi8 recording time by Y/C separation input, and is input to pin 3 of IC201 via the amplifier Q356.
(VR309 matches the pin 3 input signal to 0.5 Vp-p.)

The luminance signal input to IC201 passes clamp, hard clip, subemphasis circuits, and enters the main emphasis circuit. The main emphasis circuit may switch the time constant of pin 61 of IC201 by Hi8, normal. The time constant of Hi8 is 1/3 of normal.

The luminance signal, after emphasis, passes a white/dark clip circuit, and is output from pin 57 of IC201.

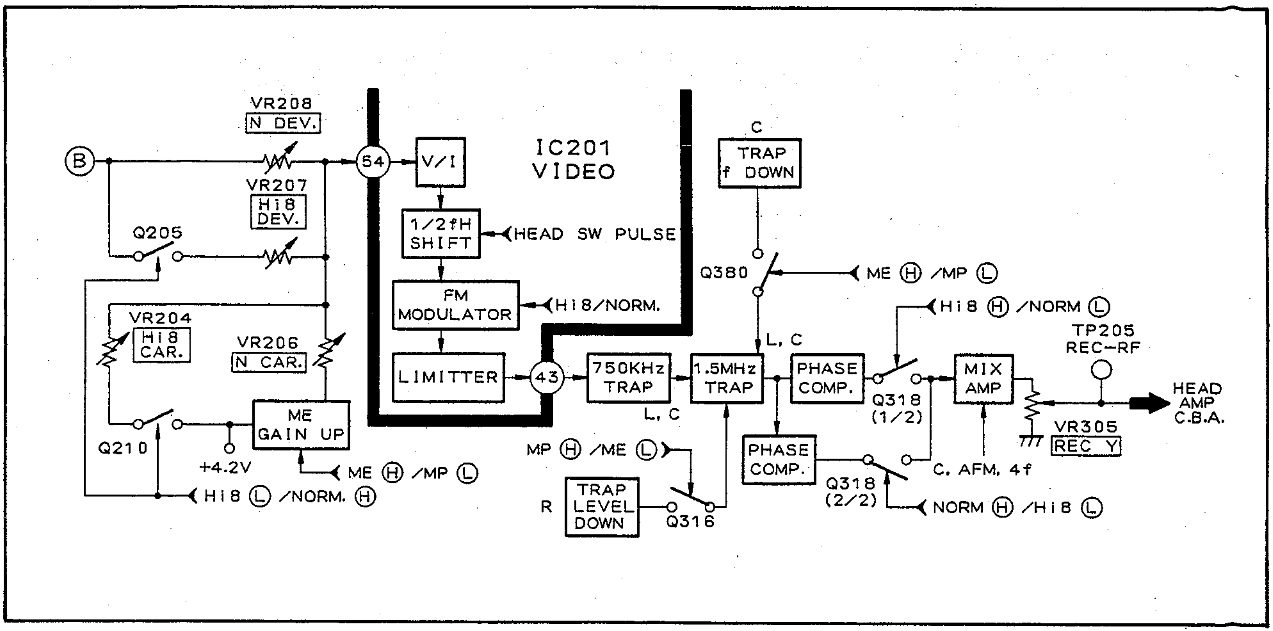

VR208
N DEV.
B
54
V/I
IC201
VIDEO
VR207
Hi8
DEV.
Q205
1/2fH
SHIFT
HEAD SW PULSE
FM
MODULATOR
Hi8/NORM.
VR204
Hi8
CAR.
VR206
N CAR.
LIMITTER
43
ME
GAIN UP
Q210
+4.2V
ME Ⓗ/MP Ⓛ
Hi8 Ⓛ/NORM. Ⓗ
C
TRAP
f DOWN
Q380
ME Ⓗ/MP Ⓛ
Hi8 Ⓗ/NORM Ⓛ
L, C
TP205
REC-RF
750KHz
TRAP
1.5MHz
TRAP
PHASE
COMP.
Q318
(1/2)
MIX
AMP
HEAD
AMP
C.B.A.
L, C
MP Ⓗ/ME Ⓛ
PHASE
COMP.
VR305
REC Y
C. AFM. 4f
R
TRAP
LEVEL
DOWN
Q316
Q318
(2/2)
NORM Ⓗ/Hi8 Ⓛ

Fig. I-82

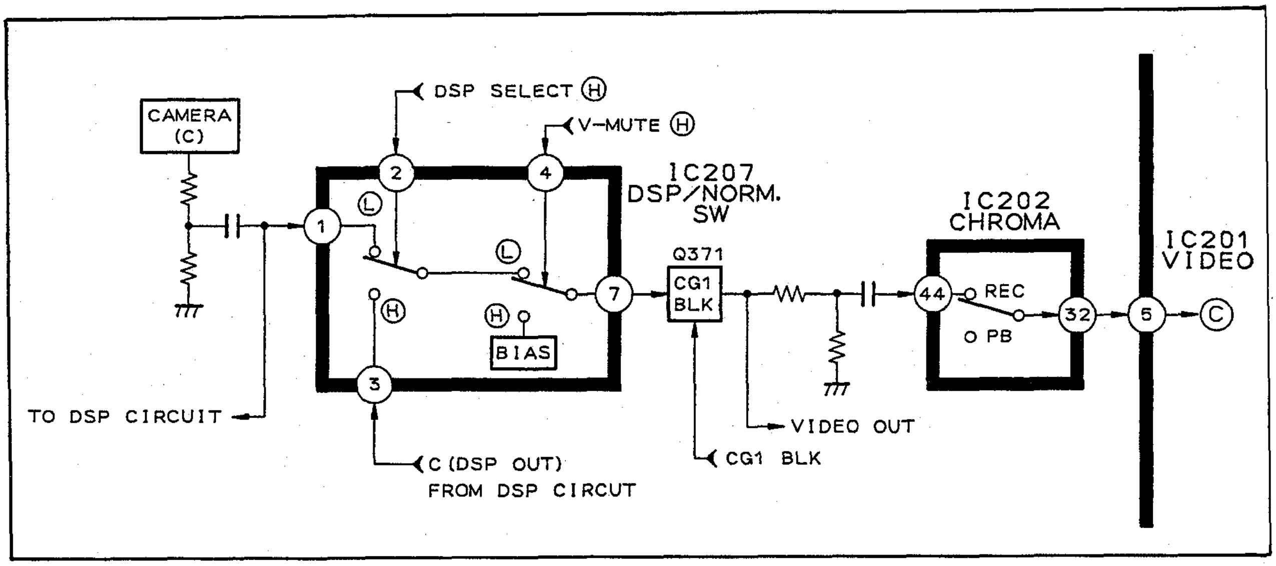
The luminance signal output from pin 57 of IC201 is subjected to the carrier deviation adjustment of FM modulation, and is input to pin 54 of IC201. After input to IC201, the voltage/current are converted and receives the 1/2 fH carrier shifting at alternate 1V interval, and is frequency-modulated.

The frequency-modulated Y-FM signal is amplitude-limited by limiter, and output from pin 43 of IC201.

The Y-FM signal output from IC201 passes 750 KHz chroma-audio band and 1.5 MHz trap to prevent impact on audio signal. The 1.5 MHz trap is switched according to a kind of tape characteristic and Hi8/NORM. Also, the phase correction is switched according to a kind of it.

After trapping, the Y-FM signal is mixed with other recording signals, then passes VR305 (REC Y) for recording current adjustment, and is applied to the head amplifier C.B.A.

2) Chrominance signal system

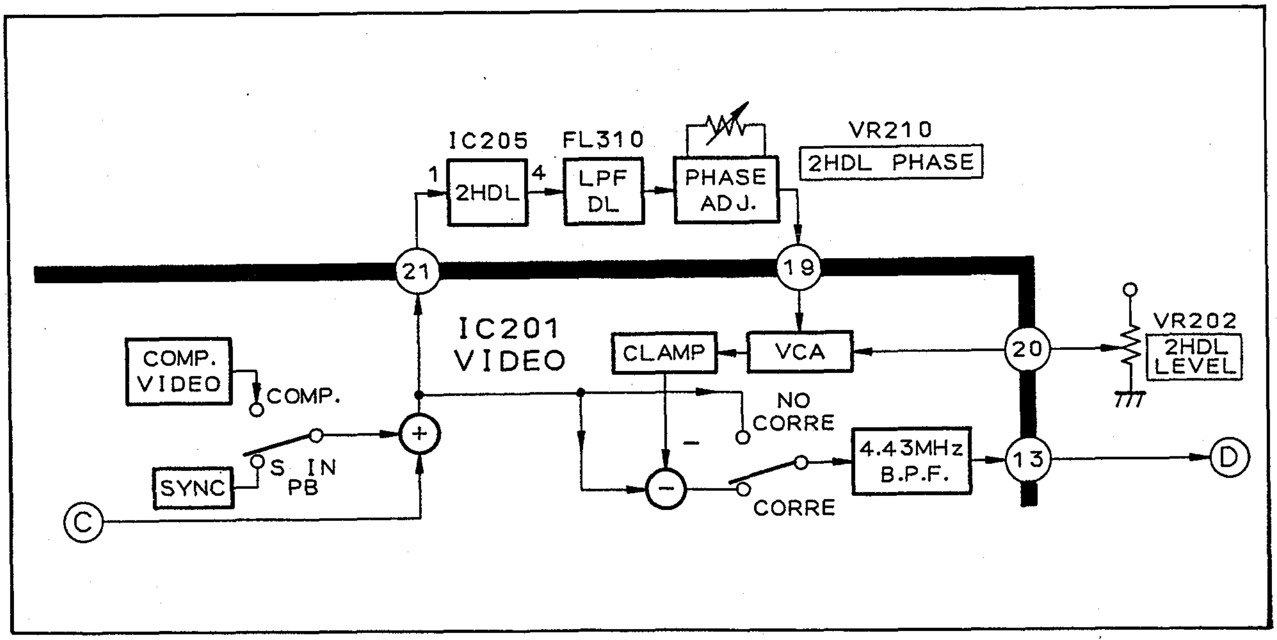


CAMERA (C)
DSP SELECT Ⓗ
V-MUTE Ⓗ
IC207 DSP/NORM. SW
IC202 CHROMA
IC201 VIDEO
1
2
4
7
3
Ⓛ
Ⓛ
Ⓗ
Ⓗ
BIAS
Q371
CG1 BLK
44
REC
PB
32
5
Ⓒ
TO DSP CIRCUIT
C (DSP OUT) FROM DSP CIRCUT
VIDEO OUT
CG1 BLK

Fig. I-83

The chroma-signal input from camera passes is fed to IC207. In IC207, there are the option SW between the signal from DSP, and video mute SW, through which color signal is output from pin 7.

After IC207 output, the chroma signal's CG1 BLK (character generator blanking) portion is decolorized, chroma signal passes IC202, and is fed to pin 5 of IC201.



IC205
FL310
VR210
2HDL PHASE
1
2HDL
4
LPF DL
PHASE ADJ.
21
19
IC201 VIDEO
CLAMP
VCA
20
VR202
2HDL LEVEL
COMP. VIDEO
COMP.
SYNC
S IN PB
+
NO CORRE
-
CORRE
4.43MHz B.P.F.
13
Ⓓ
Ⓒ

Fig. I-84

Chroma signal is input to the Y/C separation circuit which consists of IC201 (VIDEO) and IC205 (2HDL). The chroma signal, to which a synchronous signal is added for 2HDL, is output to the Y/C separation circuit, and is separated by 4.43 MHz BPF, to be output from pin 13 of IC201.

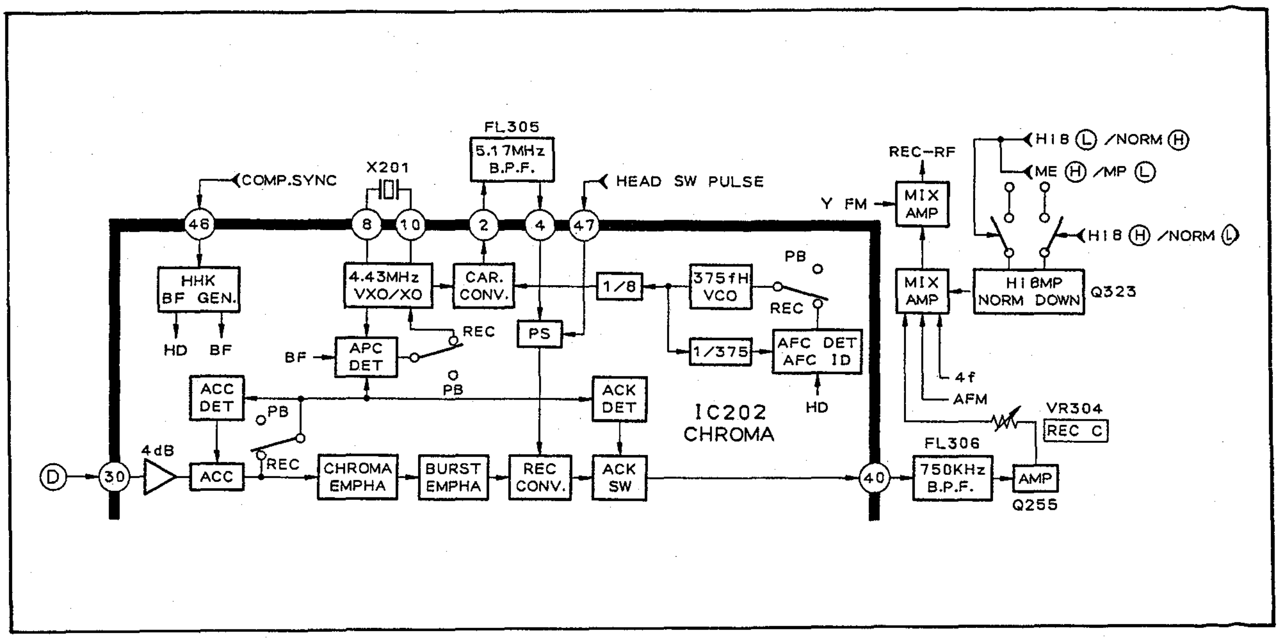

FL305
5.17MHz B.P.F.
X201
COMP.SYNC
HEAD SW PULSE
REC-RF
Y FM
MIX AMP
HI8 Ⓛ /NORM Ⓗ
ME Ⓗ /MP Ⓛ
HI8 Ⓗ /NORM Ⓛ
46
8
10
2
4
47
HHK BF GEN.
HD
BF
4.43MHz VXO/XO
CAR. CONV.
1/8
375fH VCO
PB
REC
MIX AMP
HI8MP NORM DOWN
Q323
REC
PS
1/375
AFC DET AFC ID
BF
APC DET
PB
4f
AFM
ACC DET
PB
ACK DET
IC202 CHROMA
HD
VR304
REC C
4dB
FL306
D
30
ACC
REC
CHROMA EMPHA
BURST EMPHA
REC CONV.
ACK SW
40
750KHz B.P.F.
AMP
Q255

Fig. I-85

The chroma signal output from pin 13 of IC201 is input to pin 30 of IC202. After the ACC, chroma emphasis, and the burst emphasis, it's low frequency portion is converted to 732 KHz. Next, it passes the ACK SW, and it is output from pin 40 of IC202, passes 750 KHz BPF, and, after amplification, is mixed with other recording signal at appropriate mixing rate. When an HiMp or Normal tape is used, the low frequency signal of chroma audio ATF gains down and is recorded.

(A) APC circuit (recording time)

The phases of burst component of chroma signal after ACC, and the signal from 4.43 MHz VXO/XO are compared in APC detecting circuit, and, by the resulting phase error, 4.43 MHz VXO/XO is controlled. Consequently, the phase of 4.43 MHz VXO/XO locks in burst signal of input signal.

(B) AFC circuit (recording time)

The synchronous signal (HD) separated from input signal and 1/375 of 375 fH VCO output signal are phasially compared in the AFC detection circuit. The 375 fH VCO is controlled by the phase error of them. Consequently, 375 fH VCO is phase-locked in the horizontal synchronous signal of input signal.

(2) Playback system

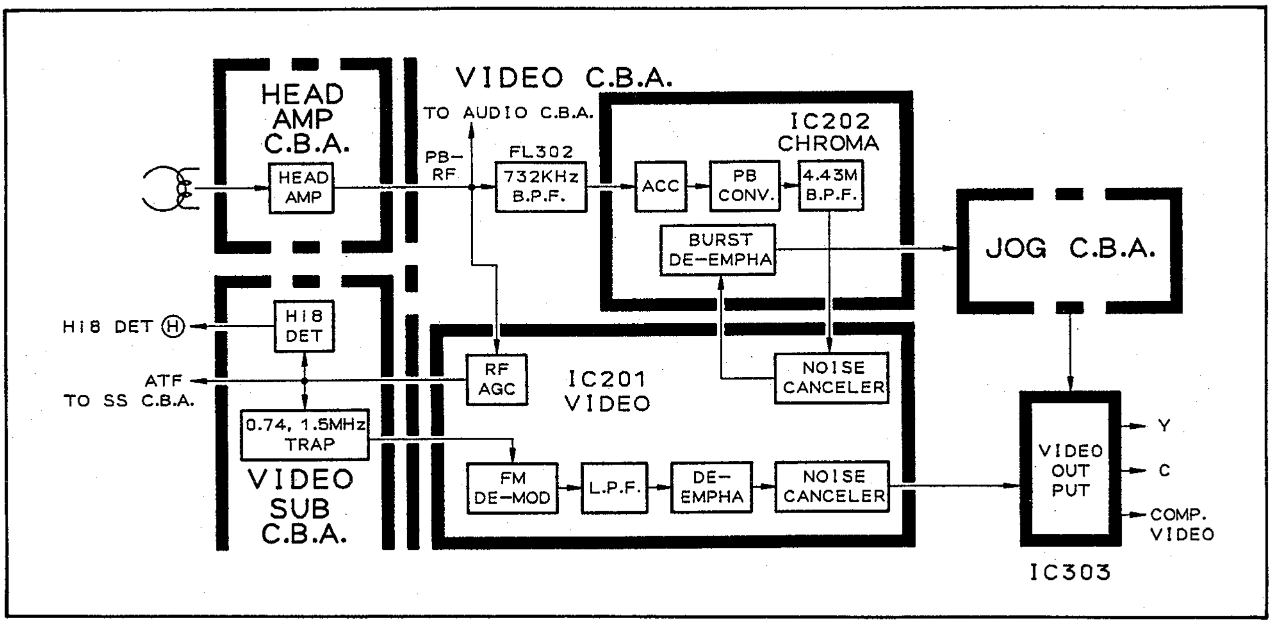

VIDEO C.B.A.
HEAD AMP C.B.A.
HEAD AMP
TO AUDIO C.B.A.
PB-RF
FL302
732KHz B.P.F.
IC202 CHROMA
ACC
PB CONV.
4.43M B.P.F.
BURST DE-EMPHA
JOG C.B.A.
Hi8 DET
Hi8 DET
ATF TO SS C.B.A.
0.74, 1.5MHz TRAP
VIDEO SUB C.B.A.
RF AGC
IC201 VIDEO
NOISE CANCELER
FM DE-MOD
L.P.F.
DE-EMPHA
NOISE CANCELER
VIDEO OUT PUT
IC303
Y
C
COMP. VIDEO

Fig. I-86

The signal from a video head is amplified in head amplifier C.B.A., and then input to the VIDEO C.B.A. Finally, it is divided into 1.) Luminance signal system, 2) Chroma signal system, 3) Audio singal system.

The signal of luminance signal system is, after RF-AGC, fed to the VIDEO SUB C.B.A. to remove the chroma, audio signal band. Next, the signal is input to the VIDEO C.B.A. (IC201) for frequency-modulation, deemphasis and noise cancellation, and then output. The signal after RF-AGC is also used in Hi8 detection circuit and ATF control circuit.

The signal of chroma signal system passes the 732 KHz BPF and is fed to IC202, and after ACC, it is frequency-converted, passes 4.43 MHz BPF, and input to IC201. The chroma signal subjected to noise cancellation in IC201 is subjected to the deemphasis in IC202, and is output from IC202.

The luminance and chroma signals output from IC201 and 202 and is applied to IC303. Input to IC303 is amplified, and output from VIDEO, S-terminals.

1) Luminance signal system

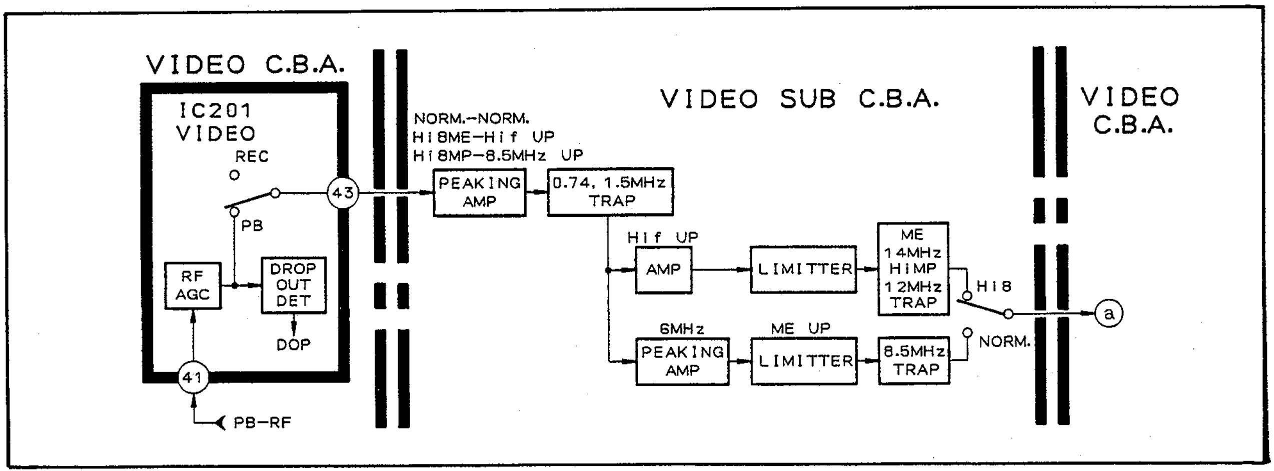

VIDEO C.B.A.
IC201 VIDEO
REC
PB
RF AGC
DROP OUT DET
DOP
43
41
PB-RF
VIDEO SUB C.B.A.
NORM.-NORM.
Hi8ME-Hif UP
Hi8MP-8.5MHz UP
PEAKING AMP
0.74, 1.5MHz TRAP
Hif UP
AMP
LIMITTER
ME 14MHz HiMP 12MHz TRAP
Hi8
6MHz
PEAKING AMP
ME UP
LIMITTER
8.5MHz TRAP
NORM.
a
VIDEO C.B.A.

Fig. I-87

The PB-RF signal of luminance signal is, after AGC in IC201, fed to the VIDEO SUB C.B.A. The signal after AGC is also input to drop out detection circuit to control the ON/OFF of the dropout correction circuit.

The signal input to the VIDEO SUB C.B.A. is amplified by the amplifier switched between the tape and the recording modes, as follows:

° Normal recording tape playback time ... Normal amplifier
° Hi8 recording ME tape playback .... High frequency amplitude amplifier
° Hi8 recording MP tape playback .... 8.5 MHz peaking amplifier

This is because the Hi8 playback signal is amplified and elevated, and high frequency characteristic of ME tape is capable of amplifying high frequency better than the MP tape.

Next, the signal passes the trap of chroma audio signal band, and proceeds in 2 different directions (A) Hi8 and (B) Normal.

(A) Hi8 playback signal

After high frequency amplitude amplification, it is fed to limiter and its unnecessary high frequency is eliminated by the ME 14 MHz, HiMP 12 MHz trap.

(B) Normal playback signal

After 6 MHz peaking amplification, it is fed to the limiter to eliminate its unnecessary high frequency by 8.5 MHz trap. As ME tape has outstanding high frequency feature, relatively more limiter is imposed.

The signals output from the Hi8 and normal circuits are selected by SW and input to the VIDEO C.B.A.

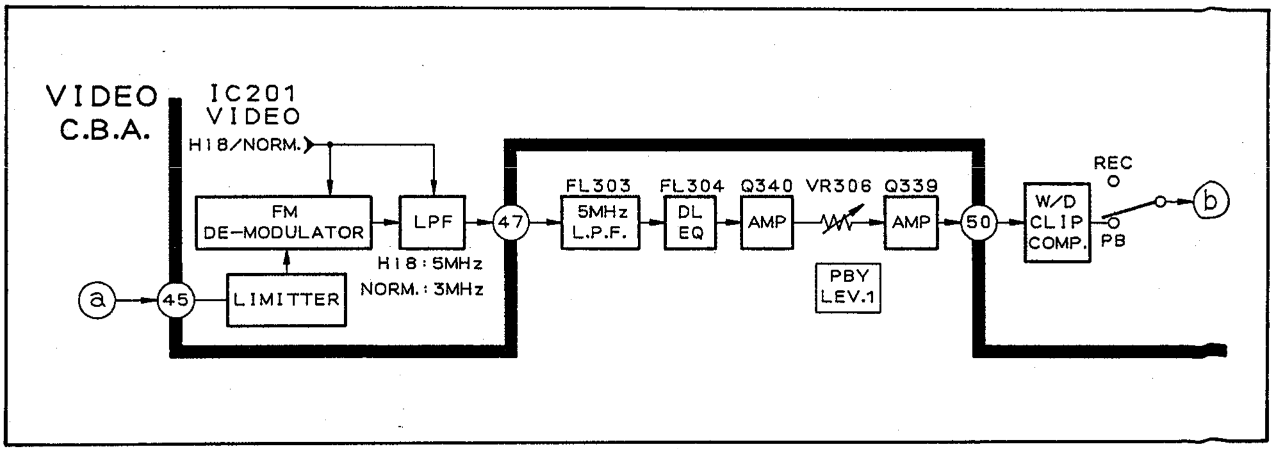


Fig. I-88

The signal input to the VIDEO C.B.A. undergoes the limiter by FC201, and FM-demodulator. The LPF after the FM-demodulator is switched over to 5 MHz (Hi8 time) and 3 MHz (normal time), and the luminance signal which passed such LPF is output from IC201 once.

The signal passes 5 MHz LPF, delay/equalizer, amplifier, and is applied to IC201 again. The VR306 matches the signal output from pin 7 of IC207 to 0.5 Vp-p. (Refer to Fig. I-89 below).

The signals lost by white/dark clip at recording of signals input to pin 50 of IC201 are corrected.

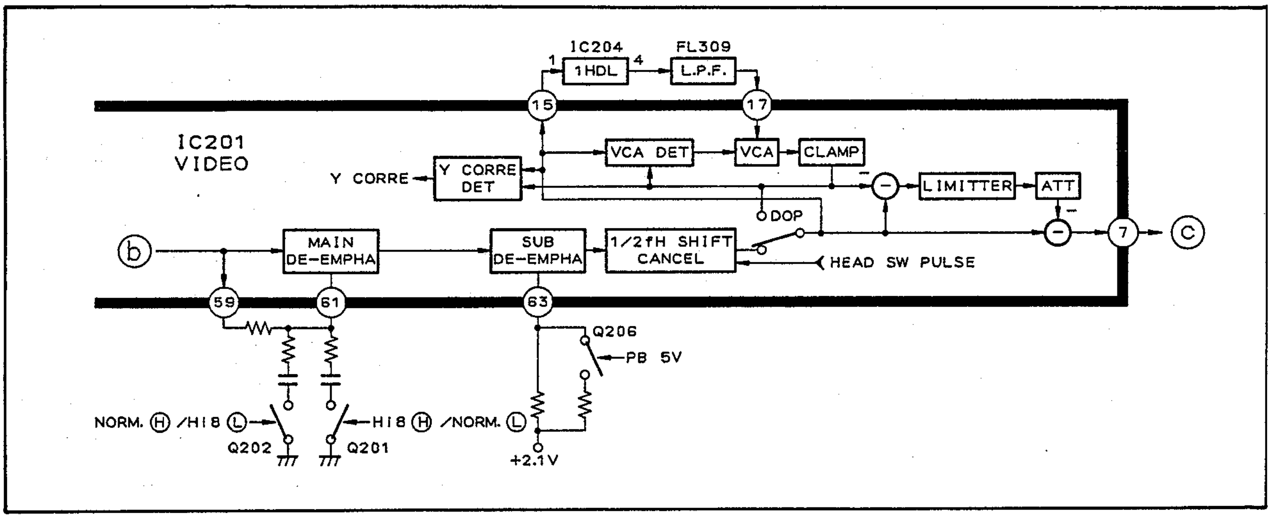

IC204
1HDL
FL309
L.P.F.
IC201
VIDEO
Y CORRE
Y CORRE DET
VCA DET
VCA
CLAMP
LIMITTER
ATT
DOP
MAIN DE-EMPHA
SUB DE-EMPHA
1/2fH SHIFT CANCEL
HEAD SW PULSE
Q206
PB 5V
NORM. Ⓗ /HI8 Ⓛ
Q202
Q201
HI8 Ⓗ /NORM. Ⓛ
+2.1V
15
17
59
61
63
7
ⓑ
ⓒ

Fig. I-89

The luminance signal corrected by white/dark clip passes the main deemphasis circuit, which switches time constance by Hi8/Normal in the same manner as recording time, and is fed to the sub-deemphasis circuit. The sub-deemphasis circuit cooperates with sub-deemphasis circuit used in recording by reversing the action characteristics to change time constant at playback time.

After subemphasis, the signal is fed back with DC shifted 1/2 fH per 1V at recording time, and receives dropout correction and noise elimination.

- ° Dropout correction:
  When dropout is detected from PB-RF, SW moves to the DOP side, and then the signal (1HDL) makes a loop to correct the drop out.

- ° Noise elimination:
  The signals made 1HDL and the original signals are subtracted by IC204 to extract the noise without the line correction and cross-work component. The signals are subtracted from luminance signals after the limiter and the attenuator to eliminate the crosstalk component.

The luminance signals after the dropout correction and noise elimination are output from pin 7.

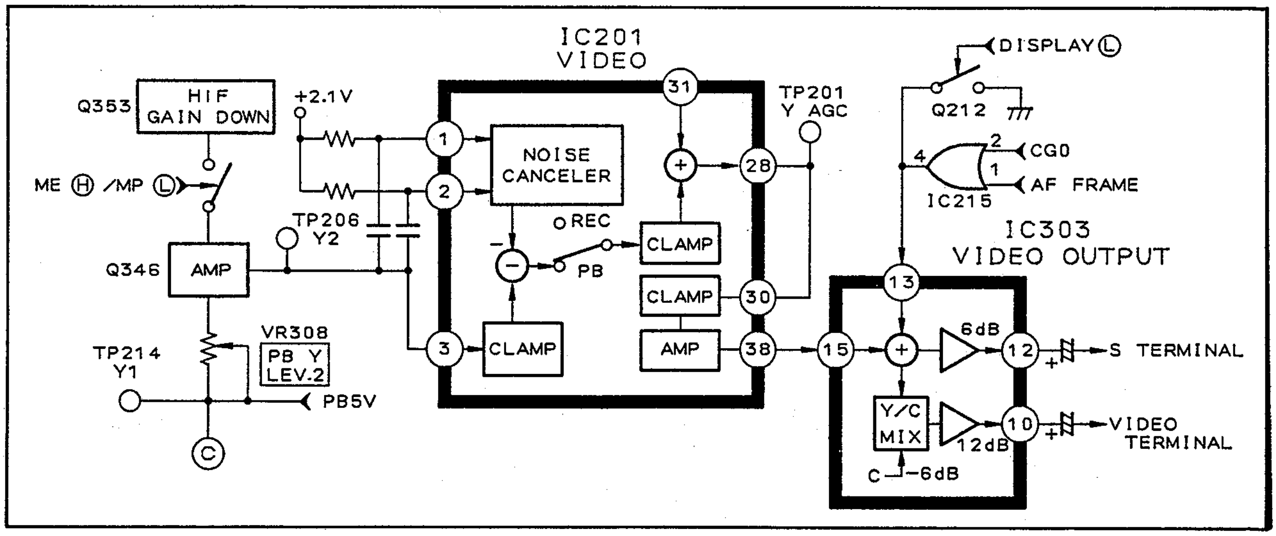

IC201
VIDEO
Q353
HIF GAIN DOWN
+2.1V
ME Ⓗ /MP Ⓛ
Q346
AMP
TP206
Y2
TP214
Y1
VR308
PB Y LEV.2
PB5V
ⓒ
NOISE CANCELER
REC
PB
CLAMP
CLAMP
CLAMP
AMP
TP201
Y AGC
DISPLAY Ⓛ
Q212
CG0
AF FRAME
IC215
IC303
VIDEO OUTPUT
6dB
12dB
Y/C MIX
C -6dB
S TERMINAL
VIDEO TERMINAL
1
2
3
31
28
30
38
15
13
12
10

Fig. I-90

The luminance signal output from pin 7 of IC201 passes Q346 amplifier (gain is reduced with an MP tape), matched with 0.5 Vp-p (at white 100% signal) by VR308, and input to pin 3 of IC201.

In IC201, the high frequency micro components of luminance signals are taken out and subtracted from luminance signals so that the noise is cancelled. The luminance signals are output from pin 28 of IC201. At variable speed playback time, the JOG VD signal is fed from pin 31 of IC201, and inserted in luminance signal.

The luminance signal output from IC201. The signal input to pin 15 of IC303 is mixed with CGO, AF frame, line Ⓗ signals which are input to pin 13, and after amplification, these signals are output to the S-terminal and the video termifnal.

2) Chroma signal system

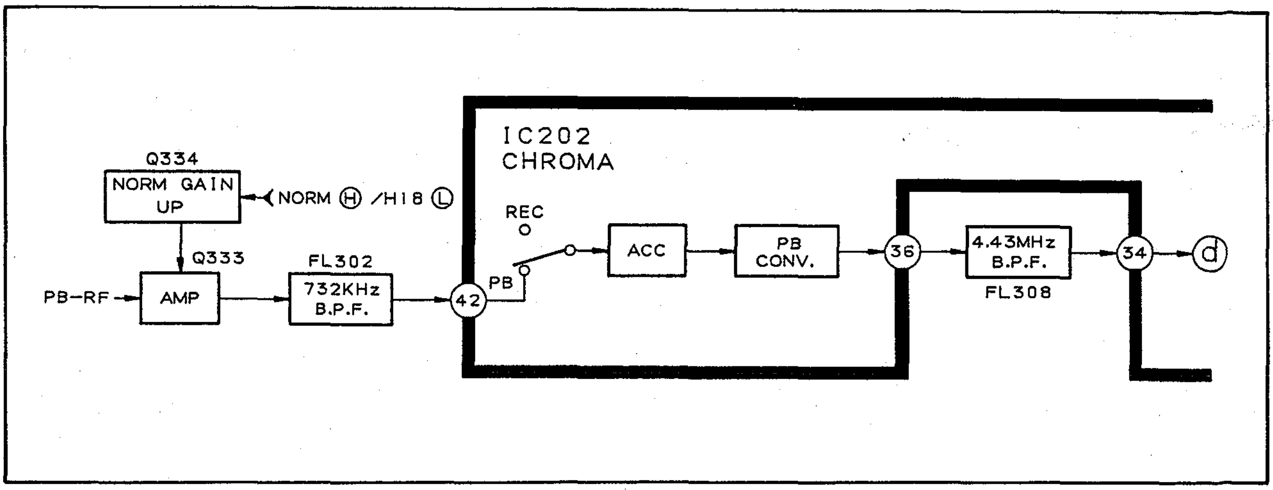

IC202
CHROMA
Q334
NORM GAIN UP
NORM Ⓗ /H18 Ⓛ
Q333
PB−RF
AMP
FL302
732KHz B.P.F.
42
REC
PB
ACC
PB CONV.
36
4.43MHz B.P.F.
FL308
34
d

Fig. I-91

After PB-RF signal for chroma signal is amplified by Q334 (the amplitude gain is raised at normal tape playback time), the chroma signal converted by 732 KHz BPF is taken out and fed to IC202.

Such signal is, after ACC, demodulated to 4.43 MHz, and output from pin 36. It then passes 4.43 MHz BPF, and is input to pin 34 of IC202 again.

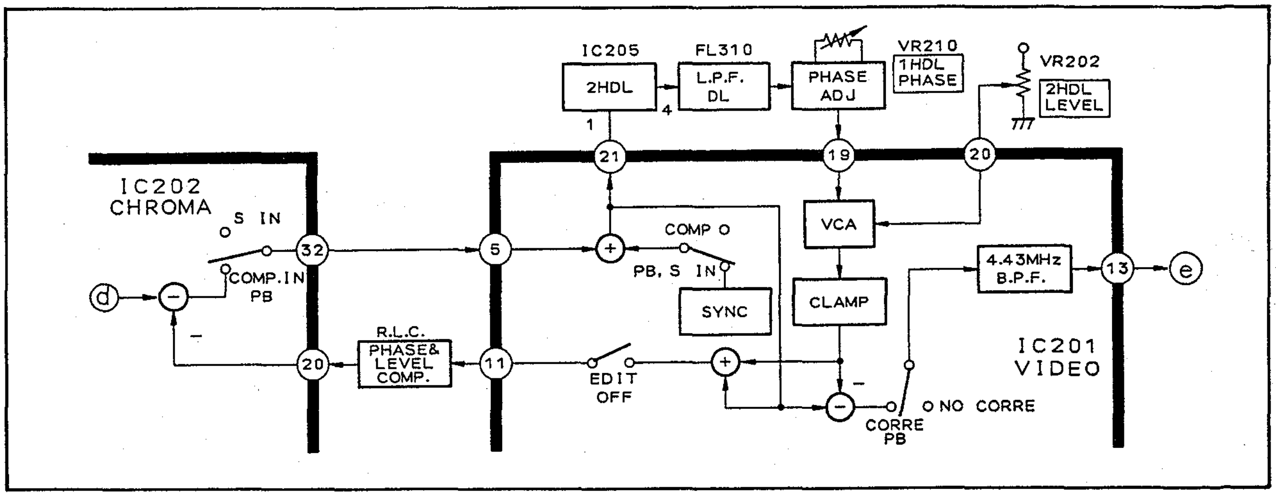
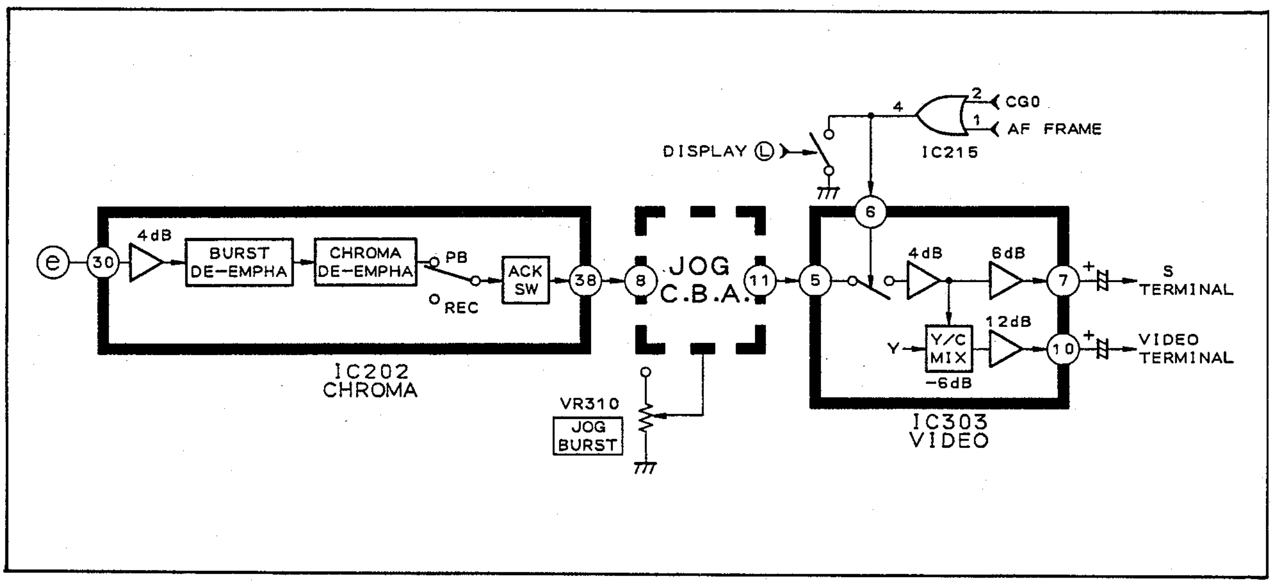

IC205
2HDL
1
4
FL310
L.P.F. DL
PHASE ADJ
VR210
1HDL PHASE
VR202
2HDL LEVEL
21
19
20
IC202
CHROMA
S IN
COMP.IN
PB
32
d
−
20
R.L.C. PHASE& LEVEL COMP.
5
11
+
COMP O
PB, S IN
SYNC
EDIT OFF
+
VCA
CLAMP
−
NO CORRE
CORRE PB
4.43MHz B.P.F.
13
e
IC201
VIDEO

Fig. I-92

After subtracting the crosstalk component taken out by IC201, it is output from pin 32 of IC202. It is subsequently input to IC201, passes Y/C separation circuit by 2HDL in the same manner as in recording, it is output. After passing the BPF of 4.43 MHz, it is output from pin 13 of IC201.

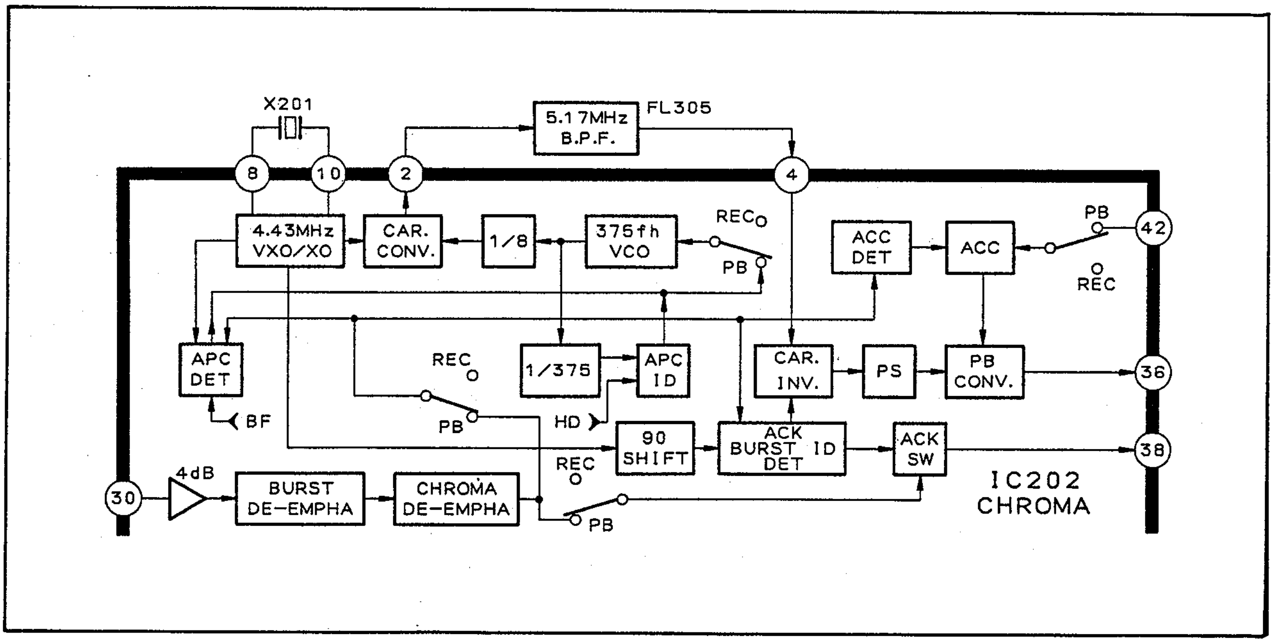


DISPLAY Ⓛ
CG0
AF FRAME
IC215
4
2
1
e
30
4dB
BURST DE-EMPHA
CHROMA DE-EMPHA
PB
REC
ACK SW
38
8
JOG C.B.A.
11
5
6
4dB
6dB
7
S TERMINAL
12dB
Y
Y/C MIX
-6dB
10
VIDEO TERMINAL
IC202 CHROMA
VR310
JOG BURST
IC303 VIDEO

Fig. I-93

The chroma signal is fed to IC202, passes amplifier, burst deemphasis, chroma deemphasis, ACK SW, and is output from pin 38 of IC202, and is applied to IC303 via the JOG C.B.A.. (VR310 is used for the JOG chrominance phase adjustment. The signal input to pin 3 of IC303 passes the SW which turns on when CG0, AF frame signal are low. Then it is amplified and output to S-terminal, video terminal.)

(A) APC circuit (playback time)



X201
5.17MHz B.P.F.
FL305
8
10
2
4
4.43MHz VXO/XO
CAR. CONV.
1/8
375fh VCO
REC
PB
ACC DET
ACC
PB
REC
42
APC DET
BF
REC
PB
1/375
APC ID
HD
CAR. INV.
PS
PB CONV.
36
90 SHIFT
ACK BURST ID DET
ACK SW
38
REC
PB
30
4dB
BURST DE-EMPHA
CHROMA DE-EMPHA
IC202 CHROMA

Fig. I-94

The carrier signal, which converts chroma signal at playback time into 4.43 MHz, is synchronized with burst signal of playback signal by APC circuit in IC202 so that the jitter component of chroma signal is eliminated.

The signals input to the APC detection circuit are the chroma signal after chroma-deemphasized and the 4.43 MHz VXO/XO output signal. The phase difference between these 2 signals controls 375 fH VCO as APC error. Besides, there is the APC ID circuit, which outputs the error determined by comparing the synchronous signal of playback signal and the 1/375 of 375 fH VCO output, for control of range outside APC.

The ACK and the BURST ID detection circuits play the following roles respectively:

° ACK circuit .... In absence of burst signal of playback signal, turn off the ACK SW to cut chroma signal.

° Burst ID circuit ... When 90° or more phase deviation is found between 4.43 MHz VXO/XO output signal (90° phase shifted at the same phase as burst signal) and the burst signal of playback signal, the carrier signal input to pin 4 of IC202 is reversed to assist APC action.

3-5 DSP circuit

3-5-1 Outline

The DSP circuit consists mainly of two IC's, DSP standard cell (IC1507) and DSP gate array (IC1506). Centered on these two IC's, the Y and C signals from the camera block (via the video C.B.A.) undergo digital processing and are input to the recording signal processing circuit of the recorder block. The DSP circuit is controlled via the SERVO MI-COM (IC101) by way of serial data communication.

The clocks used in the DSP circuit are largely divided into the fH system of H.SYNC frequency and the fsc system of subcarrier frequency. The fH system generates a clock by phase-locking VCO via H.SYNC which is separated from the input Y signal. And the fsc system generates a clock by phase-locking VCO via the subcarrier from the camera block. These clocks are divided and multiplied to form multiple clocks for use in digital signal processing.

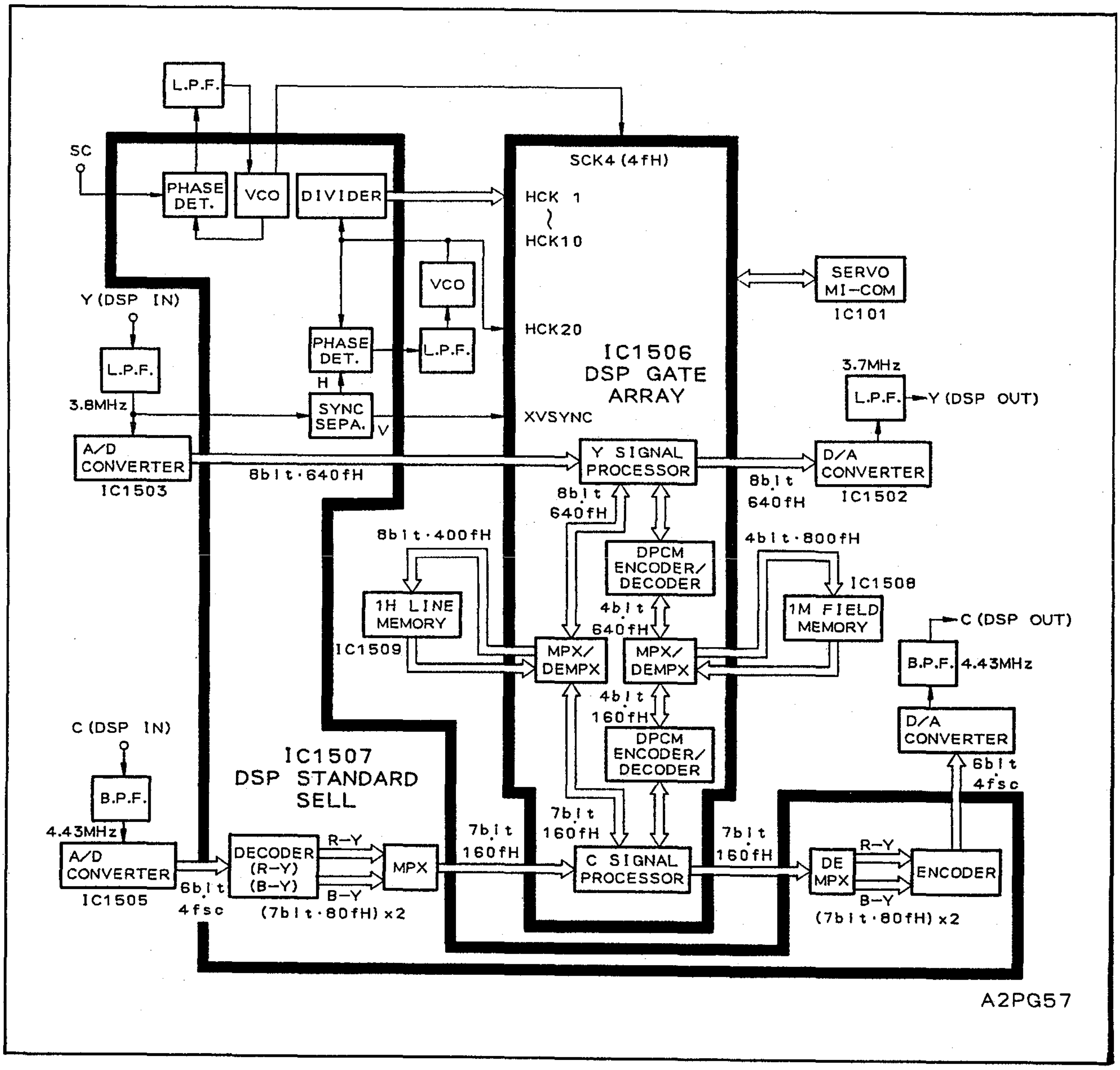

L.P.F.
SC
PHASE DET.
VCO
DIVIDER
SCK4 (4fH)
HCK 1
~
HCK10
VCO
SERVO MI-COM
IC101
Y (DSP IN)
HCK20
PHASE DET.
L.P.F.
L.P.F.
IC1506
DSP GATE ARRAY
3.7MHz
L.P.F.
Y (DSP OUT)
3.8MHz
H
SYNC SEPA.
V
XVSYNC
A/D CONVERTER
IC1503
8bit·640fH
Y SIGNAL PROCESSOR
D/A CONVERTER
IC1502
8bit 640fH
8bit 640fH
8bit·400fH
DPCM ENCODER/ DECODER
4bit·800fH
IC1508
1H LINE MEMORY
IC1509
4bit 640fH
1M FIELD MEMORY
C (DSP OUT)
MPX/ DEMPX
MPX/ DEMPX
B.P.F.
4.43MHz
4bit 160fH
C (DSP IN)
DPCM ENCODER/ DECODER
D/A CONVERTER
IC1507
DSP STANDARD SELL
6bit 4fsc
B.P.F.
4.43MHz
7bit 160fH
7bit 160fH
7bit 160fH
A/D CONVERTER
IC1505
6bit 4fsc
DECODER (R-Y) (B-Y)
R-Y
B-Y
(7bit·80fH)x2
MPX
C SIGNAL PROCESSOR
DE MPX
R-Y
B-Y
ENCODER
(7bit·80fH)x2
A2PG57

Fig. I-95

(Y and C signal flow)

The Y and C signals from the camera block via the video C.B.A. undergo A/C conversion at IC1503 and IC1505. The Y signal is thus converted into digital data of 8 bits/640 fH and the C signal into digital data of 6 bits/4 fsc. The Y signal digital data directly enters the DSP gate array (IC1506) where it undergoes digital signal processing. The C signal digital data is used for demodulation of R-Y, B-Y chrominance signals, then undergoes clock conversion and becomes R-Y (7 bits/80 fH) and B-Y (7 bits/80 fH) data. Next, R-Y and B-Y data are mixed via MPX clock, converted to 7 bits/160 fH digital data and then enter the DSP gate array.

Since digital signal processing is performed in the DSP gate array, one field of Y and C signals is stored in the field memory (IC1508). The field memory is capable of handling four bits, so the 8-bit Y signal and the 7-bit C signal must both be compressed into 4-bit data. A data compression technique called DPCM is therefore used to compress the 8 bit/640 fH Y signal and the 7 bit/160 fH C signal into 4 bit/640 fH and 4 bit/160 fH data. Both data are then mixed and converted into 4 bit/800 fH data to allow storing in the field memory.

The 1H line memory (IC1509) used in the closeup mode is capable of handling eight bits, so the Y and C signal data are mixed via the MPX clock and converted into 8 bit/400 fH data.

The Y and C signal processors located in the DSP gate array select either the one-field picture data (still picture) stored via the aforementioned method or the A/D-converted EE picture data (moving picture) from the camera block according to the mode, or else overlap these data to form special picture data for DSP.

The special picture data in the Y signal processor undergoes D/A conversion at IC1502 and enters the recorder block as analog Y signal. The special picture data in the C signal processor undergo modulation in the DSP standard cell from R-Y, B-Y chrominance signal data to carrier chrominance signal, and thus is returned to the same form of data as was input. It is then A/D-converted and enters the recorder block as analog C signal.

3-5-2 A/D converters

The IC1503 (CXD1175AM) and IC1505 (CXD1172AM) are used for A/D conversion of Y and C signals, respectively. The camera-output Y/C separate signals are converted into digital form.

(1) Y signal A/D converter

The Y signal input to the DSP circuit is fed to pin 19 of IC1503 through the 3.8 MHz low-pass filter, amplifier, clamp circuit and buffer. In IC1503, this analog input signal is sampled with the YAD-CLK (4 fsc) timing pulses appearing at pin 12 of IC1503. For each sampling, the voltage amplitude of analog signal is compared with 255 reference levels ($2^8 - 1 = 255$) in IC1503 and digitized into any one of 256 discrete values. This processing is referred to as quantization. In quantization, eight bits are assigned for representation of 256 (2^8) gradient levels. In 640 fH sampling, 640 points are sampled per horizontal scan interval. Generally, it is required to provide a sampling frequency that is at least two times higher than the maximum input frequency. Since 640 fH (10 MHz) sampling is performed in this camcorder, up to 5 MHz is allowed as the upper input level of Y signal bandwidth. After conversion to 8-bit digital form, the Y signal is delivered to the DSP gate array (IC1506).

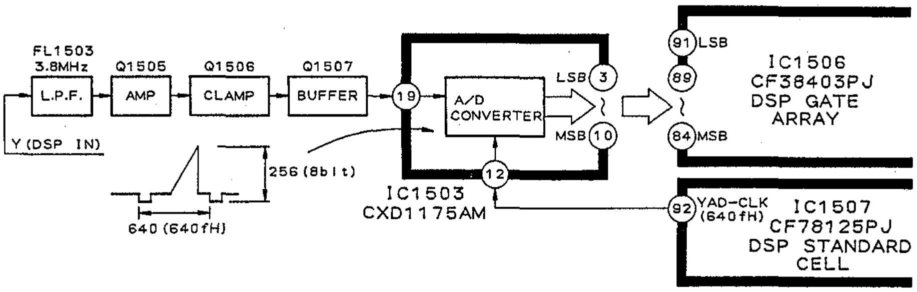

FL1503
3.8MHz
L.P.F.
Q1505
AMP
Q1506
CLAMP
Q1507
BUFFER
Y (DSP IN)
256 (8bit)
640 (640fH)
19
A/D
CONVERTER
LSB 3
MSB 10
12
IC1503
CXD1175AM
91 LSB
89
84 MSB
IC1506
CF38403PJ
DSP GATE
ARRAY
92 YAD-CLK (640fH)
IC1507
CF78125PJ
DSP STANDARD
CELL

Fig. I-96

(2) C signal A/D converter

In the same manner as for Y signal A/D conversion, the C signal is input to the DSP amplifier, 4.43 MHz band-pass filter, buffer and clamp circuit. The sampling frequency is 4 fsc (CAD-CLK) and six bits are assigned in quantization of the C signal. That is, for each sampling, the voltage amplitude of 4.43 MHz carrier chrominance signal is compared with 63 reference levels ($2^6 - 1 = 63$) in IC1505 and digitized into any one of 64 discrete values. As to the sampling point, the carrier chrominance signal is sampled at a phase angle of every 90°. After conversion to 6-bit digital form, the C signal is delivered to the DSP standard cell (IC1507).

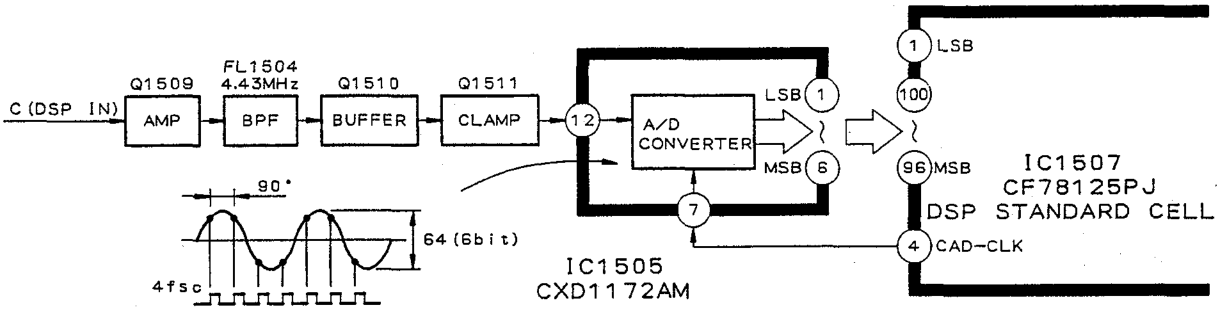

C (DSP IN)
Q1509
AMP
FL1504
4.43MHz
BPF
Q1510
BUFFER
Q1511
CLAMP
90°
64 (6bit)
4fsc
12
A/D
CONVERTER
LSB 1
MSB 6
7
IC1505
CXD1172AM
1 LSB
100
96 MSB
IC1507
CF78125PJ
DSP STANDARD CELL
4 CAD-CLK

Fig. I-97

3-5-3 Field memory

The field memory is used to store one field (313 horizontal lines) of Y signal (8 bits) and C signal (6 bits) that have been digitized through A/D conversion. This camcorder is provided with 1 Mbit field memory IC (TMS4C1050) for Y signal and signal.

(1) Field memory

The field memory IC (TMS4C1050) is capable of handling four bits for input/output. The 8-bit Y signal and 7-bit C signal are stored into the one field memory IC after compression by DPCM and MPX.

Functionally, the field memory operation is categorized into the write and read sequences. Each of the write and read sequences is controlled by the output signal furnished from the DSP gate array (IC1506).

(Write operation sequence)

The write operation sequence is carried out using the following three signals.

WRITE Ⓗ : Serves as a control signal for write operation. When this signal goes 'Low', a write into the field memory is inhibited.

RSTW (FM) Ⓗ: Used as a reset pulse for initializing the write address (clearing to address 0). While the WRITE Ⓗ signal is 'High', the input data is written into the field memory on the leading edge of this pulse in synchronization with the FMW-CLK signal.

FMW-CLK : Used as a clock pulse for write operation. The clocking frequency is 800 fH. In synchronization with the leading edge of this clock signal, the input data is written into the field memory.

(Read operation sequence)

The read operation sequence is carried out using the following three signals.

READ Ⓗ : Serves as a control signal for read operation. When this signal goes 'Low', a read from the field memory is inhibited.

RSTR (FM) Ⓗ: Used as a reset pulse for initializing the read address (clearing to address 0). While the READ Ⓗ signal is 'High', the stored data is read out of the field memory on the leading edge of this pulse in synchronization with the FMR-CLK signal.

FMR-CLK : Used as a clock pulse for read operation. In the normal operation, the clocking frequency is 800 fH as in writing into the field memory. In closeup, however, the 400 fH clocking frequency is used for accomplishing 2x zooming.

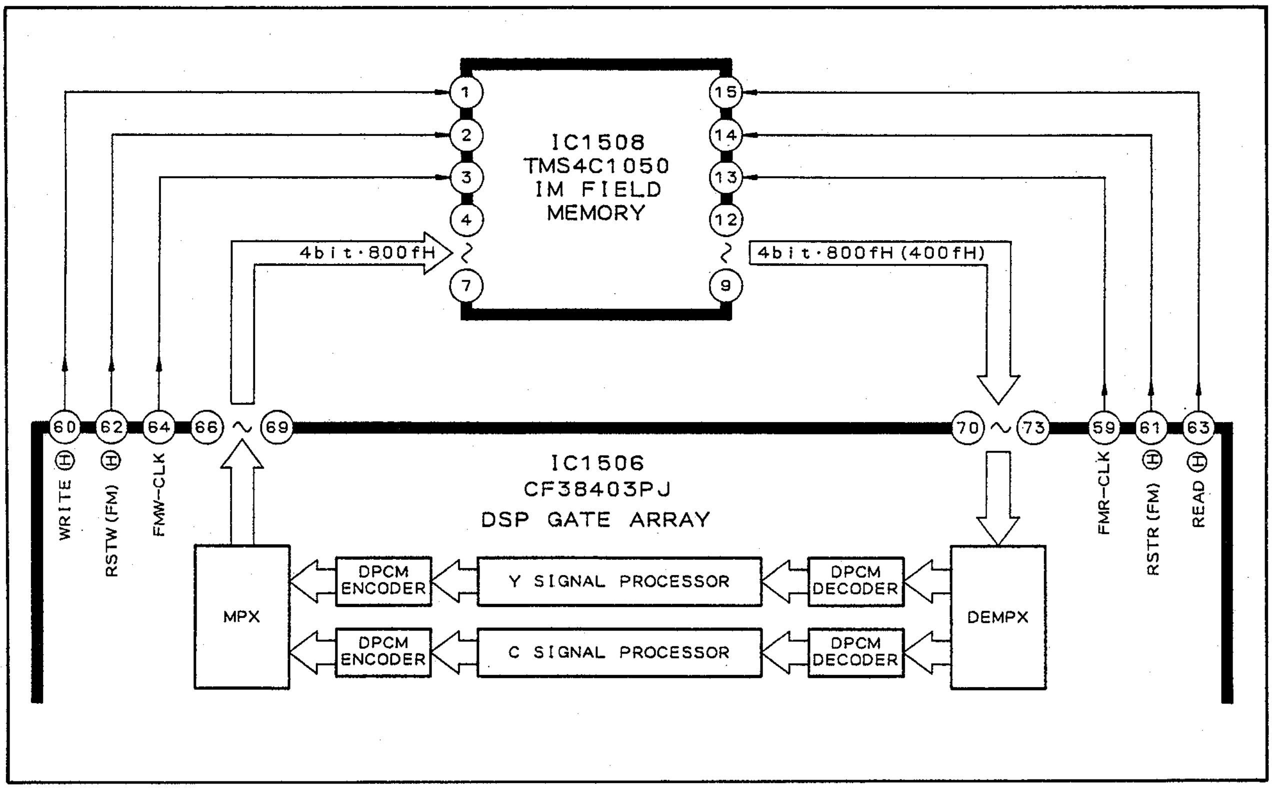

IC1508
TMS4C1050
IM FIELD
MEMORY
1
2
3
4
7
15
14
13
12
9
4bit·800fH
4bit·800fH (400fH)
60
62
64
66
69
70
73
59
61
63
WRITE Ⓗ
RSTW (FM) Ⓗ
FMW-CLK
FMR-CLK
RSTR (FM) Ⓗ
READ Ⓗ
IC1506
CF38403PJ
DSP GATE ARRAY
MPX
DPCM ENCODER
DPCM ENCODER
Y SIGNAL PROCESSOR
C SIGNAL PROCESSOR
DPCM DECODER
DPCM DECODER
DEMPX

Fig. I-98

(2) Timing

For the purpose of describing the write and read timing sequences, the stroboscopic effect picture (when the freeze key is pressed over a second) timing chart is shown in Fig. I-99. The write and read operations in the DSP gate array are controlled under direction of the SERVO microcomputer (IC101) through serial data communication. To prevent 0.5H skew distortion, each write operation is performed for every 313 horizontal scan intervals. For identification in this sequence, the FRAME REF signal is given to the SERVO microcomputer. Thus, only for a field identified with the 'High' level of FRAME REF signal, the SERVO microcomputer issues the write instruction to the DSP gate array.

Upon receiving the write instruction from the SERVO microcomputer, the DSP gate array latches its internal vertical synchronization (equivalent to DSP VREF) and generates such controls signals as WRITE Ⓗ and READ Ⓗ for presiding over the field memory.

Described below is the operation sequence shown in the timing chart.

On the leading edge of the RSTW (FM) Ⓗ signal, the C signal data is written into the field memory. While the WRITE signal is 'High', a write operation is formed for 313 horizontal scan lines, causing one field of data to be stored into the memory. At the same time, since the RSTR (FM) is set to 'High' state, 312 horizontal lines of previously written data are read out. In the read sequence, since the READ signal remains 'High', a read operation is performed on each leading edge of the RST (FM) Ⓗ pulse. As indicated in the timing chart, the data is read in a cycle of 312H, 313H, 312H, and so on. In the STROBE mode, a write operation is performed for every 8 fields. Therefore, the read-out data provides intermittent playback images of 8/50 seconds. The intermittent interval of stroboscopic effect or slow shutter operation is altered by changing this write cycle. Therefore, when the STILL or OVERLAP FREEZE mode, the still pictures can be output in succession by continuously reading out the written data. Refer to the description given in Section 2 - New Technologies.

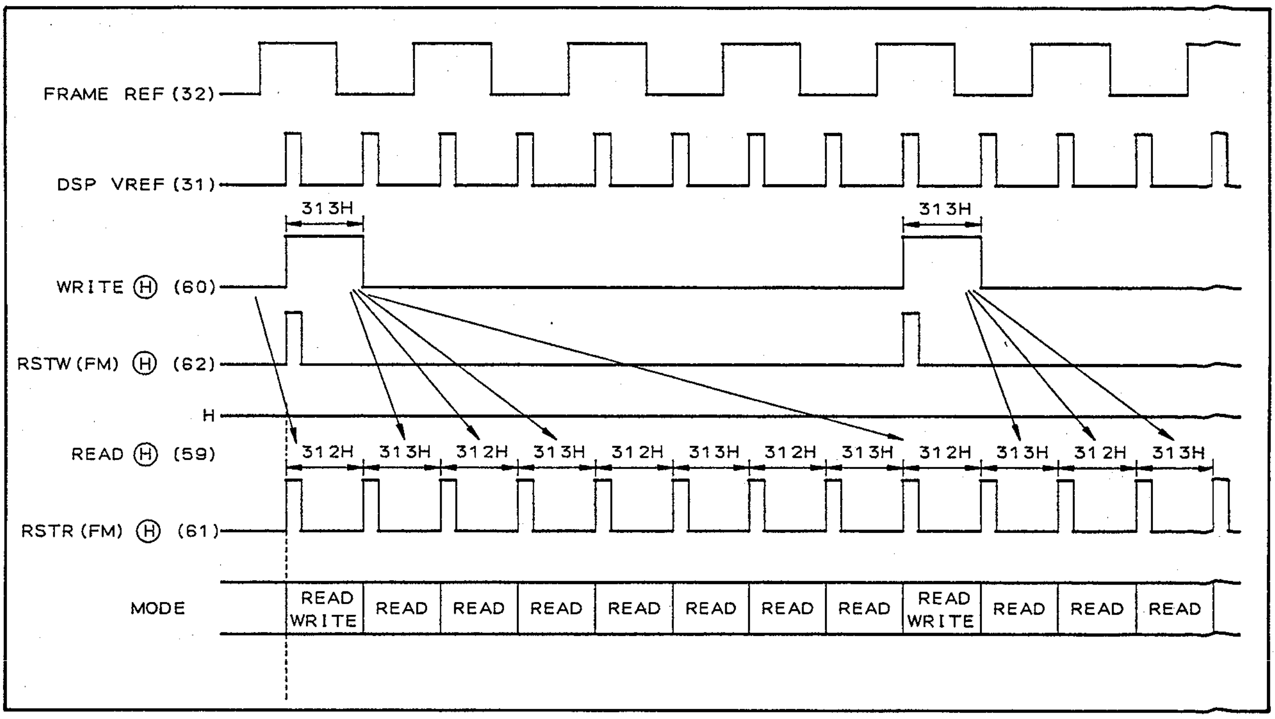

FRAME REF (32)
DSP VREF (31)
313H
313H
WRITE Ⓗ (60)
RSTW (FM) Ⓗ (62)
H
READ Ⓗ (59)
312H
313H
312H
313H
312H
313H
312H
313H
312H
313H
312H
313H
RSTR (FM) Ⓗ (61)
MODE
READ WRITE
READ
READ
READ
READ
READ
READ
READ
READ WRITE
READ
READ
READ

Fig. I-99

3-5-4 D/A converters

Whereas the IC1502 (CXD1171M) is used for D/A conversion of Y signal, the current adder circuit consisting of register and transistor elements is employed for D/A conversion of C signal. These circuits are functionally equivalent in principle. Described below first are the functions and operations of the C signal D/A converter.

(1) C signal D/A converter

This circuit receives the 6-bit digital signal output from pins 14 to 9 of the DSP standard cell (IC1507) and converts it into the analog carrier chrominance signal again.

The weight-function resistors are connected in series with pins 14 and 9 of the DSP standard cell. Starting from the LSB position at pin 14, the resistance values are assigned in the following descending order; 32 kilohms, 16 kilohms, 8 kilohms, 4 kilohms, 2 kilohms, and 1 kilohm. A current flowing through each resistor has thus binary weighting. Each current is added through R713, and sum current is applied to Q1518 for current-to-voltage conversion. D/A conversion is carried out in this manner to produce the C signal containing 4 fsc sampling clock component. After D/A conversion, the C signal is passed through 4.43 MHz band-pass filter and than it is delivered to the recorder video circuit via the 4.43 buffer.

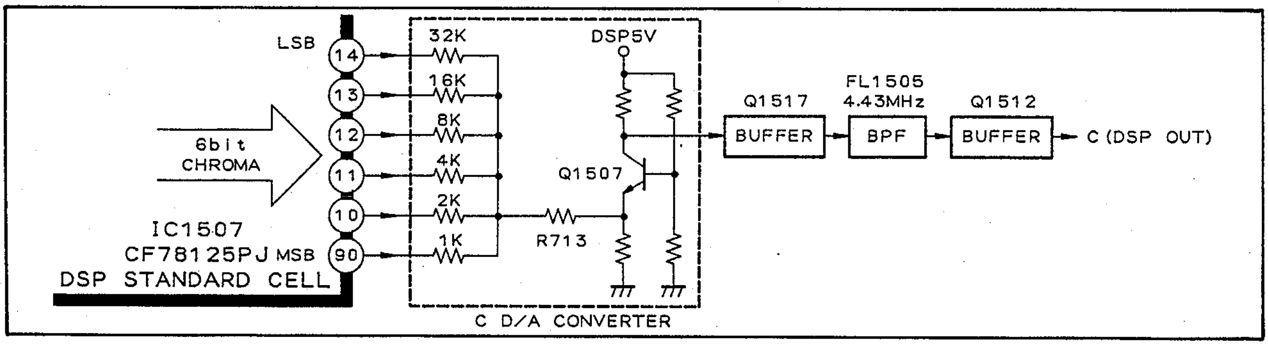

LSB
14
13
12
11
10
9
MSB
6bit
CHROMA
IC1507
CF78125PJ
DSP STANDARD CELL
32K
16K
8K
4K
2K
1K
DSP5V
Q1507
R713
C D/A CONVERTER
Q1517
BUFFER
FL1505
4.43MHz
BPF
Q1512
BUFFER
C (DSP OUT)

Fig. I-100

(2) Y signal D/A converter

The 8-bit digital signal output from pins 82 to 74 of the DSP gate array (IC1506) is converted into analog form in the IC1502. Since the IC1502 (CXD1171M) is designed as a general-purpose D/A converter, clocking is required to its operation. The HCK10 (640 fH) signal synchronized with the 8-bit digital signal is used for this clocking. On each leading edge of this clock signal, the IC1052 converts the 8-bit digital signal (represented in 256 levels) into the equivalent amplitude of analog voltage.

The analog Y signal subjected to D/A conversion contains 640 fH sampling clock component (same as in D/A conversion of C signal). Therefore, after D/A conversion, the analog Y signal is passed through the 3.7 MHz low-pass filter and then it is delivered to the video circuit.

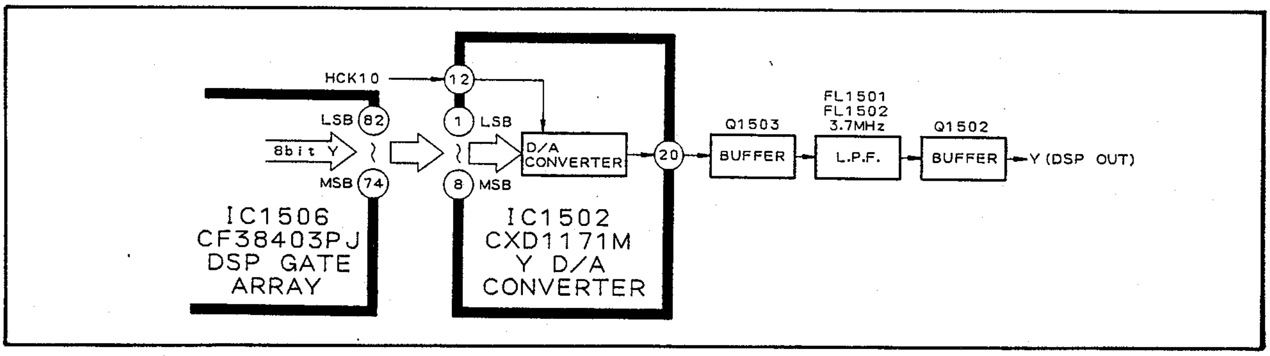

HCK10
12
LSB 82
8bit Y
MSB 74
1 LSB
8 MSB
D/A CONVERTER
20
IC1506
CF38403PJ
DSP GATE ARRAY
IC1502
CXD1171M
Y D/A CONVERTER
Q1503
BUFFER
FL1501
FL1502
3.7MHz
L.P.F.
Q1502
BUFFER
Y (DSP OUT)

Fig. I-101

3-5-5 Pin functions of DSP gate array (IC1506)

Table I-11 (1/2)

Pin No.	Signal designation	I/O	Function
1 ≀ 8	CDO 6 ≀ CDO 0 *excluding pin 3	O	Chrominance signal digital data output (7 bits)
3	VDD	I	Connected to DSP 5V.
9	XVSYNC	I	Vertical sync signal input
10	ODD Ⓗ	I	Field discrimination signal input. ODD field 'H', EVEN field 'L'.
11	HSYNC	I	Horizontal sync signal input.
12	-	-	Open.
13 14	BFM HSM	O	Unused.
15	VSS	-	Connected to GND.
16	SCK4	I	Clock input (4 fsc)
17	-	-	Connected to DSP 5V.
18	HD	I	HD pulse input.
19	HBLK	I	HBLK pulse input.
20	HCK1	I	Clock input (1.25 MHz = 80 fH)
21	HCK2	I	Clock input (2.5 MHz = 160 fH)
22	HCK5	I	Clock input (5 MHz = 320 fH)
23	HCK10	I	Clock input (10 MHz = 640 fH)
24 25	H REF. CONT. MEMORY THROUGH	O	Unused.
26	-	-	Connected to GND.
27	HCK20	I	Clock input (20 MHz = 1280 fH)
28	VDD	I	Connected to DSP 5V.
29 30	-	-	Connected to GND.
31	DSP V-REF	O	Vertical sync signal to SERVO MI-COM (IC101).
32	FRAME REF	O	Frame reference signal to SERVO MI-COM (IC101). Although 313H and 312H are used alternately for the field switching frequency of the field memory, this signal is used to obtain the timing for selecting 313H at write-in to the field memory.
33	DSP-DATA IN	I	Data input for serial data communication with SERVO MI-COM (IC101).
34	DSP-CS	I	Chip select signal for serial data communication with the SERVO MI-COM (IC101). Communication is carried out while this signal is 'H'.
35	DSP-CLOCK IN	I	Clock input for serial data communication with the SERVO MI-COM (IC101).
36	RSTR (LM) Ⓛ	O	Line memory readout address reset signal.
37	RSTW (LM) Ⓛ	O	Line memory write-in address reset signal.
38	LMR-CLK	O	Line memory readout clock (400 fH approx.).
39	LMW-CLK	O	Line memory write-in clock (400 fH approx.).
40	VSS	-	Connected to GND.
41 ≀ 48	LM OUT 7 ≀ LM OUT 0	O	Line memory data output (8 bits). Y/C multiplex data.
49 ≀ 57	LM IN 7 ≀ LM IN 0 *excluding pin 53	I	Line memory data input (8 bits). Y/C multiplex data.

Table I-11 (2/2)

Pin No.	Signal designation	I/O	Function
53	VDD	I	Connected to DSP 5V.
58	-	-	Connected to GND.
59	READ Ⓗ	O	Read enable; field memory readout enable signal.
60	WRITE Ⓗ	O	Write enable; field memory write-in enable signal.
61	RSTR (FM) Ⓗ	O	Field memory readout address reset signal.
62	RSTW (FM) Ⓗ	O	Field memory write-in address reset signal.
63	FMR-CLK	O	Field memory readout clock (800 fH approx.).
64	FMW-CLK	O	Field memory write-in clock (800 fH approx.).
65	VSS	-	Connected to GND.
66 ≀ 69	FM OUT 0 ≀ FM OUT 3	O	Field memory data output (4 bits); Y/C multiplex data.
70 ≀ 73	FM IN 0 ≀ FM IN 3	I	Field memory data input (4 bits); Y/C multiplex data.
74 ≀ 82	Y D/A 7 ≀ Y D/A 0 *excluding pin 78	O	Y signal digital data output (8 bits).
78	VDD	I	Conencted to DSP 5V.
83 ≀ 91	Y A/D 7 ≀ Y A/D 0 *excluding pin 90	O	Y signal digital data input (8 bits).
90	VSS	-	Connected to GND.
92	-	-	Connected to GND.
93	-	-	Open.
94 ≀ 100	CDI 6 ≀ CDI 0	I	Chrominance signal digital data input (7 bits).

3-5-6 Pin functions of DSP standard cell (IC1507)

Table I-12 (1/2)

Pin No.	Signal designation	I/O	Function
1	C A/D 0	I	Chroma signal digital data input (LSB).
2	-	-	Connected to DSP 5V.
3	VDD	I	Connected to DSP 5V.
4	CAD-CLK	0	Chroma signal A/D conversion clock (4 fsc).
5	-	-	For the pull-down circuit.
6	-	-	Connected to GND.
7	XSYNC IN	I	Composite sync signal input.
8	-	-	Connected to GND.
9 ≀ 14	C D/A 5 ≀ C D/A 0	0	Chroma signal digital data output (6 bits).
15	VSS	-	Connected to GND.
16	-	-	Open.
17	-	-	Connected to DSP 5V.
18	-	-	Connected to GND.
19	SCK4 IN	I	Clock input (4 fsc).
20	VDD	I	Connected to DSP 5V.
21	SCK4 OUT	0	VCO output (4 fsc).
22	C1S	I	For connecting capacitor for VCO center frequency setting.
23	R2S	I	For connecting resistor for VCO oscillation frequency variable range setting.
24	VCOINS	I	VCO control voltage input.
25	R1S	I	For connecting resistor for VCO center frequency setting.
26	VSS	-	Connected to GND.
27	PCOUTS	0	Phase comparator output.
28	VSS	-	Connected to GND.
29	PCBS	I	Comparison input for phase comparator.
30	PCAS	I	Reference input for phase comparator.
31	PCREFS	0	Output of reference signal for phase comparison.
32	PCVARS	0	Output of comparison signal for phase comparison.
33	VDD	I	Connected to DSP 5V.
34	XSCRC	0	fsc inversion signal output.
35	SCRC	I	fsc signal input.
36,37	-	-	Connected to GND.
38	-	-	Open.
39,40	VSS	-	Connected to GND.
41	-	-	Open.
42	-	-	Connected to GND.
43 ≀ 45	-	-	Connected to DSP 5V.
46	VDD	I	Connected to DSP 5V.
47	PCOUTH	0	Phase comparator output.
48	VDD	I	Connected to DSP 5V.
49	PCBH	I	Comparison input for phase comparator.
50	PCAH	I	Reference input for phase comparator.
51	PCREFH	0	Output of reference signal for phase comparison.
52	PCVARH	0	Output of comparison signal for phase comparison.
53	HCK20	I	Clock input (20 MHz = 1280 fH).

Table I-12 (2/2)

Pin No.	Signal designation	I/O	Function
54	VDD	I	Connected to DSP 5V.
55	-	-	Connected to GND.
56 57	MEMORY THROUGH H REF. CONT.	I	Unused.
58	HCK10	O	Clock output (10 MHz = 640 fH).
59	HCK5	O	Clock output (5 MHz = 320 fH).
60	HCK2	O	Clock output (2.5 MHz = 160 fH).
61	HCK1	O	Clock output (1.25 MHz = 80 fH).
62	HBLK	O	HBLK pulse output.
63	HD	O	HD pulse output.
64	-	-	Open.
65	VSS	-	Connected to GND.
66	SCK4	O	Clock output 94 fsc).
67 68	HSM BFM	I	Unused.
69	-	-	Connected to GND.
70	HSYNC	O	Horizontal sync signal output.
71	ODD Ⓗ	O	Field discrimination signal output. ODD field 'H', EVEN field 'L'.
72	XVSYNC	O	Vertical sync signal output.
73 ≀ 80	CDI 0 ≀ CDI 6 *excluding pin 78	I	Color differential signal digital data input (7 bits).
78	VDD	I	Connected to DSP 5V.
81,82	-	-	Connected to GND.
83 ≀ 89	CDO 0 ≀ CDO 6	O	Color defferential signal digital data output (7 bits).
90	VSS	-	Connected to GND.
91	-	-	Connected to GND.
92	YAD-CLK	O	Y signal A/D conversion clock (10 MHz).
93	-	-	Connected to DSP 5V.
94	-	-	For the pull-down circuit.
95	-	-	Connected to GND.
96 ≀ 100	C A/D 5 ≀ C A/D 1	I	Chroma signal digital data input (6 bits). * 6 bits including pin 1 (C A/D 0).

3-6 Audio circuit

(1) Recording system

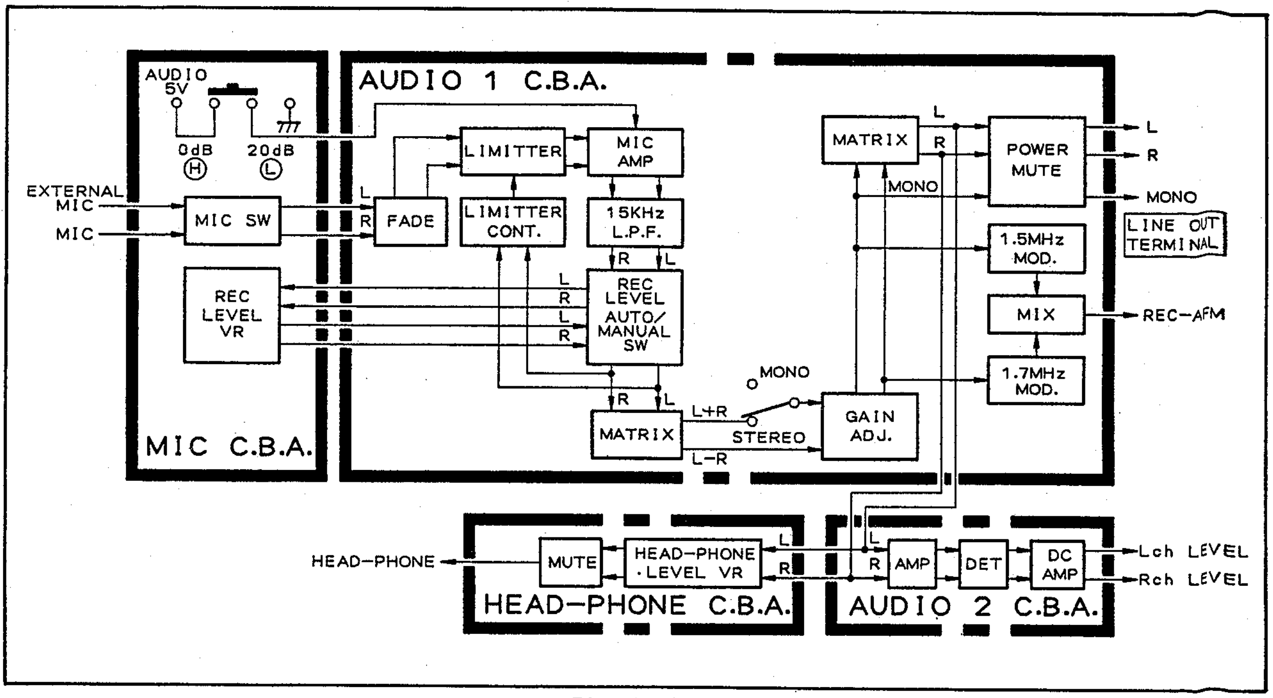

AUDIO 5V
0dB
20dB
Ⓗ
Ⓛ
EXTERNAL MIC
MIC
MIC SW
REC LEVEL VR
MIC C.B.A.
AUDIO 1 C.B.A.
L
R
FADE
LIMITTER
MIC AMP
LIMITTER CONT.
15KHz L.P.F.
R
L
REC LEVEL AUTO/ MANUAL SW
R
L
MATRIX
L+R
L-R
MONO
STEREO
GAIN ADJ.
MATRIX
L
R
MONO
POWER MUTE
1.5MHz MOD.
MIX
1.7MHz MOD.
L
R
MONO
LINE OUT TERMINAL
REC-AFM
HEAD-PHONE
MUTE
HEAD-PHONE ·LEVEL VR
HEAD-PHONE C.B.A.
L
R
AMP
DET
DC AMP
AUDIO 2 C.B.A.
Lch LEVEL
Rch LEVEL

Fig. I-102

The signal from microphone passes through the microphone switch (external preferred SW), and is input to the AUDIO 1 C.B.A. The signal which passed through the AUDIO 1 C.B.A. enters the limiter circuit through the fade circuit. The level of limiter circuit is controlled by the L and R signals before the matrix circuit so as to prevent the distortion of audio signal. At manual mode, the gain is fixed at a specific level.

In the next step, the signal is amplified by the microphone amplifier which switches gain by ATT SW of MIC C.B.A. After LPF of 15 KHz, and is applied to the recording level automatic/ manual switching SW. At automatic mode, the signal is fed straight to matrix circuit, and, at manual mode, the signal is applied to matrix circuit through the recording level volume of MIC C.B.A.

The L and R signals input to matrix circuit are converted to L+R, L-R signals, and output. Then, the L+R signal and the L-R signal is fed straight to gain adjustment circuit.

In the gain adjustment circuit, level-matching between auto mode L+R signal and L-R signal is done. At manual mode, an additional attenuation of recording level volume is reduced. The signals after gain adjustment circuit is divided into recording group and line output group.

Of the recording signal group, L+R signal and L-R signal is respectively converted into 1.5 MHz and 1.7 MHz, mixed, and fed to the VIDEO C.B.A. as REC-AFM.

The Line-out signals are converted to L, R signals, which pass an output control SW, power mute circuit, and output from line terminal. The L, R signals after the matrix circuit are input to the AUDIO 2 C.B.A., and used for level meter display and headphone output. The signal for level meter is, after amplification, converted into decibel display mode and DC, and applied to the SS C.B.A. The signal for headphone output is input to the headphone C.B.A., pass headphone level volume mute circuit, and fed to headphone terminal.

(2) Playback system

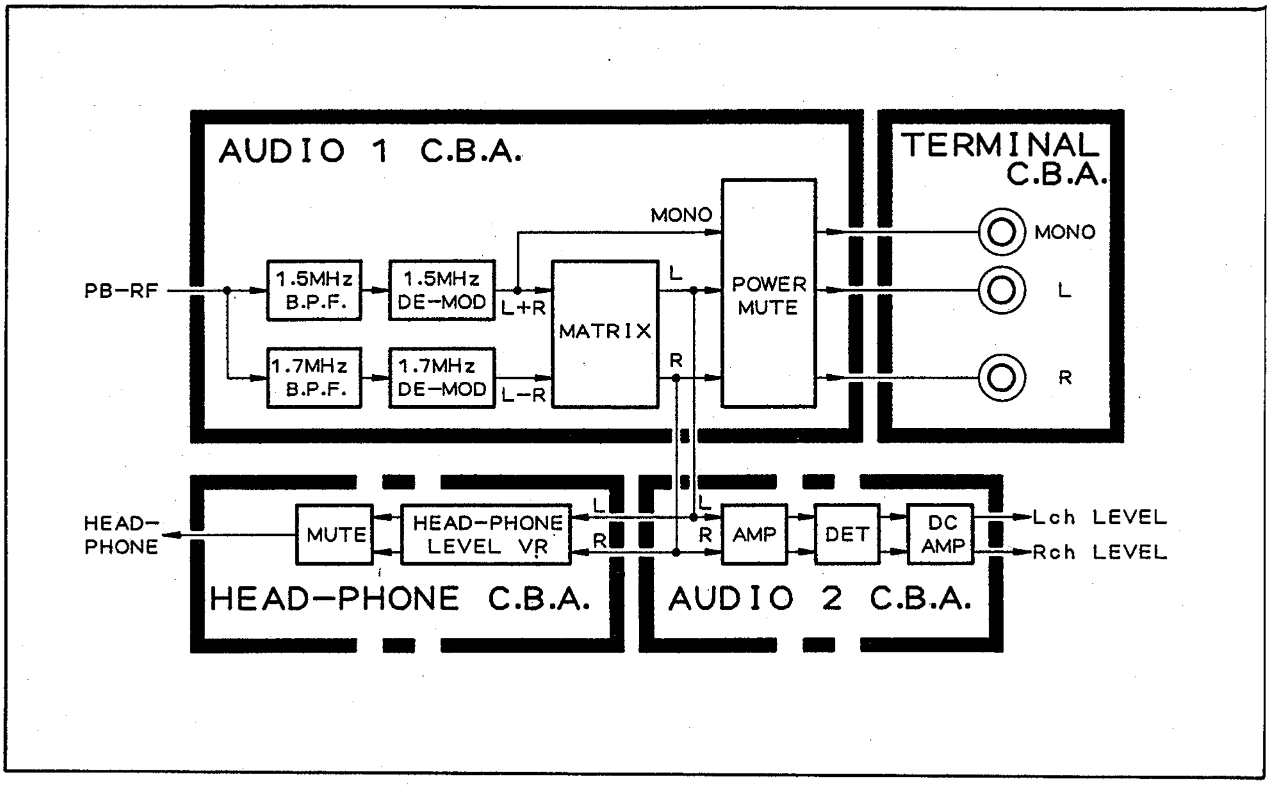

AUDIO 1 C.B.A.
TERMINAL C.B.A.
PB-RF
1.5MHz B.P.F.
1.5MHz DE-MOD
1.7MHz B.P.F.
1.7MHz DE-MOD
L+R
L-R
MATRIX
MONO
L
R
POWER MUTE
MONO
L
R
HEAD-PHONE
MUTE
HEAD-PHONE LEVEL VR
L
R
AMP
DET
DC AMP
Lch LEVEL
Rch LEVEL
HEAD-PHONE C.B.A.
AUDIO 2 C.B.A.

Fig. I-103

The PB-RF signal, which was input to AUDIO 1 C.B.A., passes BPF of 1.5 MHz and 1.7 MHz, and respectively demodulated into L+R, L-R signal., The L+R and L-R signals become L and R signals at the matrix circuit, The L+R signal is input as monaural audio signal. Respectively output from output terminal of terminal C.B.A. via the power mute circuit.

The L and R signals after the matrix circuit is processed by the signals for headphone and the level meter in the same way as in recording mode.

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CHAPTER II. DISASSEMBLING/ADJUSTMENTS

1. Before Disassembling/Adjusting

1-1 List of maintenance tools and supplies

1-1-1 Maintenance tools

DESCRIPTION	TOOL NO.	REMARKS
Alignment tape E (MONOSCO)	DY9-1062-000	
Alignment tape (V sweep master Hi8)	DY9-1111-500	
Recording current checker	DY9-1056-000	
Y/C mix amplifier II	DY9-1079-001	
Extension connector kit (A1)	DY9-1092-500	
Y/C separator	DY9-1093-500	
Extension cable kit (A2 Hi)	DY9-1110-000	New
Color bar chart	DY9-2002-000	
Registration chart	DY9-2004-000	
Logarithmic gray scale chart	DY9-2005-000	
Adjuster (2.6 mm)	DY9-2021-000	
Phillips screwdriver (bit part only)	DY9-2030-000	
Adjuster (1.8 mm)	DY9-2041-000	
Color chart viewer (5600°K)	DY9-2039-500-220	EUROPE, H.K. etc.
	DY9-2039-500-240	U.K.
Color viewer lamp (5600°K)	DY9-2040-000	
CCB12 filter (100 x 100 mm)	DY9-2042-000	
CCB8 filter (100 x 100 mm)	DY9-2043-000	
ND-2.0 filter (100 x 100 mm)	DY9-2044-000	
Gray/white chart	DY9-2045-000	

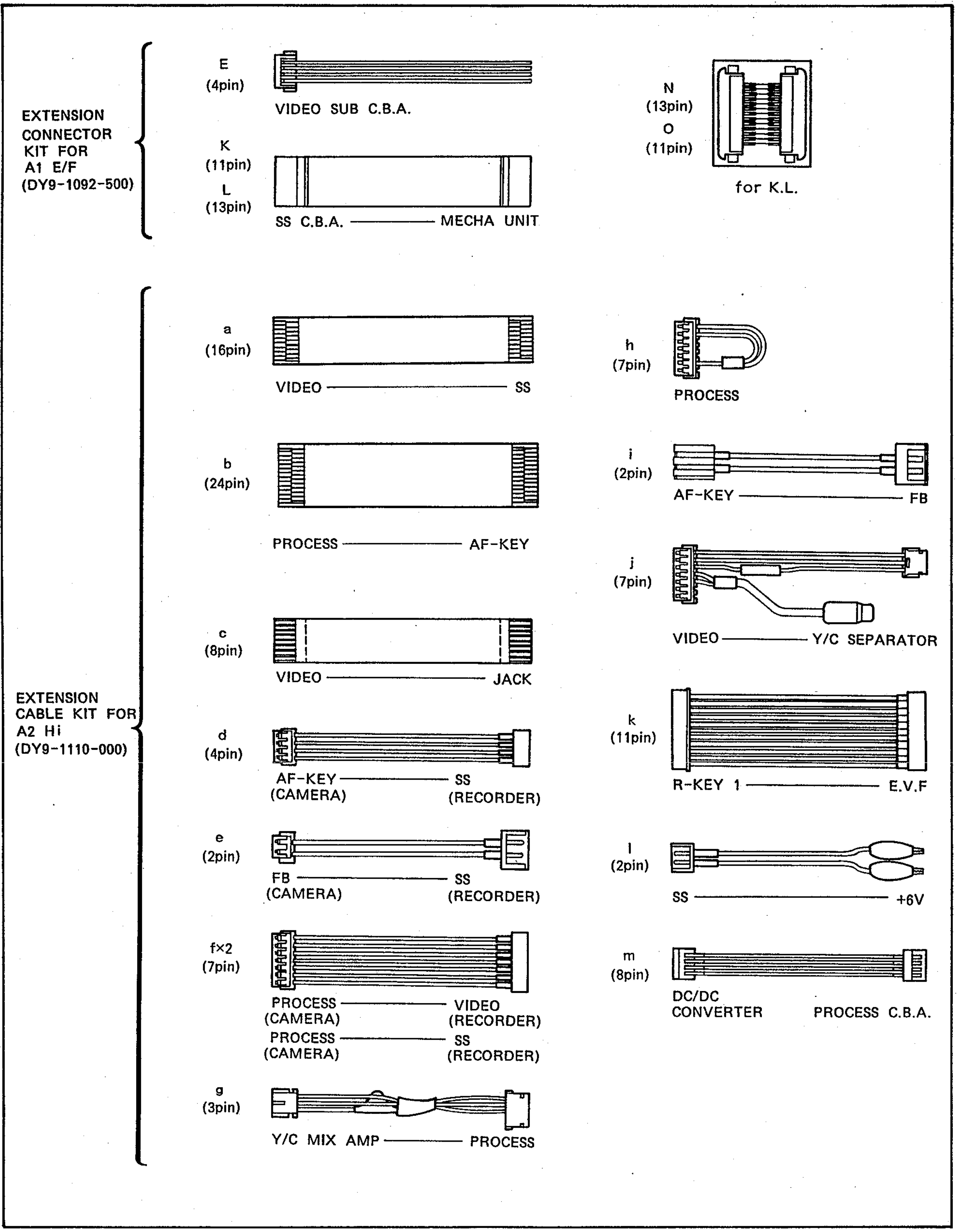
Supplies

DESCRIPTION	TOOL NO.	REMARKS
Alonalpha	CY9-8007-000	
Screw Lock 1401B	CY9-8012-000	
Grease GE-C4	CY9-8045-000	
Polyester tape	DY9-3002-000	
Teflon Fluorocarbon Resin MP-102	DY9-3013-000	
Floil G902	DY9-3017-000	

* Note: For recorder mechanism, refer to the mechanism manual for MC-4B (DY8-3391-501 201) separately issued.

1-1-2 List of extension cables

Use the following extension cables.


EXTENSION CONNECTOR KIT FOR A1 E/F (DY9-1092-500)
E (4pin)
VIDEO SUB C.B.A.
K (11pin)
L (13pin)
SS C.B.A. ——— MECHA UNIT
N (13pin)
O (11pin)
for K.L.
EXTENSION CABLE KIT FOR A2 Hi (DY9-1110-000)
a (16pin)
VIDEO ——— SS
b (24pin)
PROCESS ——— AF-KEY
c (8pin)
VIDEO ——— JACK
d (4pin)
AF-KEY (CAMERA) ——— SS (RECORDER)
e (2pin)
FB (CAMERA) ——— SS (RECORDER)
f×2 (7pin)
PROCESS (CAMERA) ——— VIDEO (RECORDER)
PROCESS (CAMERA) ——— SS (RECORDER)
g (3pin)
Y/C MIX AMP ——— PROCESS
h (7pin)
PROCESS
i (2pin)
AF-KEY ——— FB
j (7pin)
VIDEO ——— Y/C SEPARATOR
k (11pin)
R-KEY 1 ——— E.V.F
l (2pin)
SS ——— +6V
m (8pin)
DC/DC CONVERTER ——— PROCESS C.B.A.

2. Disassembling

2-1 Disassembling of covers

2-1-1 Removal of finder, cassette cover

(1) Dismount the finder.
(2) Remove two cassette cover seals.
(3) Remove two screws ⓐ.
(4) Remove the cassette cover.

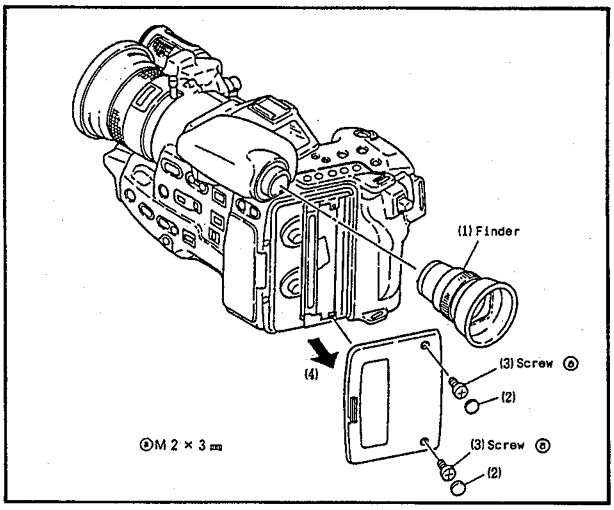

(1) Finder
(3) Screw ⓐ
(2)
(4)
(3) Screw ⓐ
(2)
ⓐM 2 × 3 mm

Fig. II-2

2-1-2 Removal of upper cover

(1) Remove seven screws ⓐ.
(2) Disconnect the connectors 2802, 051 and 003.
(3) Remove the upper cover.

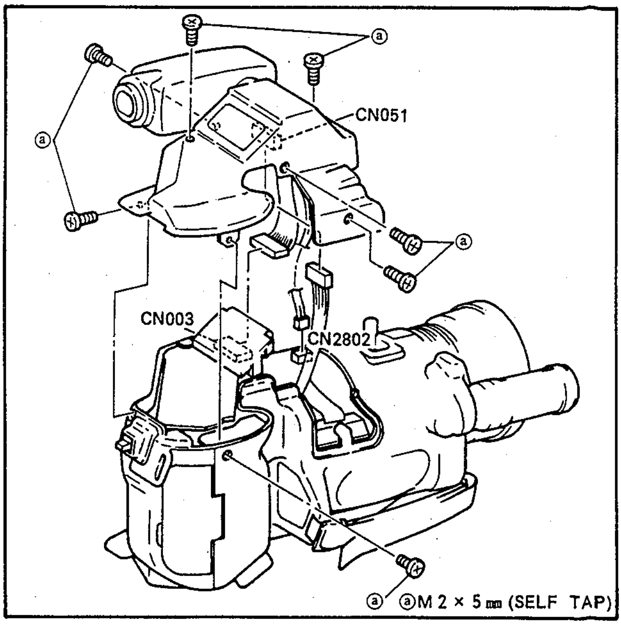

ⓐ
CN051
ⓐ
ⓐ
CN003
CN2802
ⓐ
ⓐM 2 × 5 mm (SELF TAP)

Fig. II-3

2-1-3 Removal of left cover

(1) Remove eleven screws ⓐ.
(2) Dismount the white balance sensor cover, and release the volume latches Ⓛ and Ⓡ.
(3) To remove the left cover, remove the lens cap.

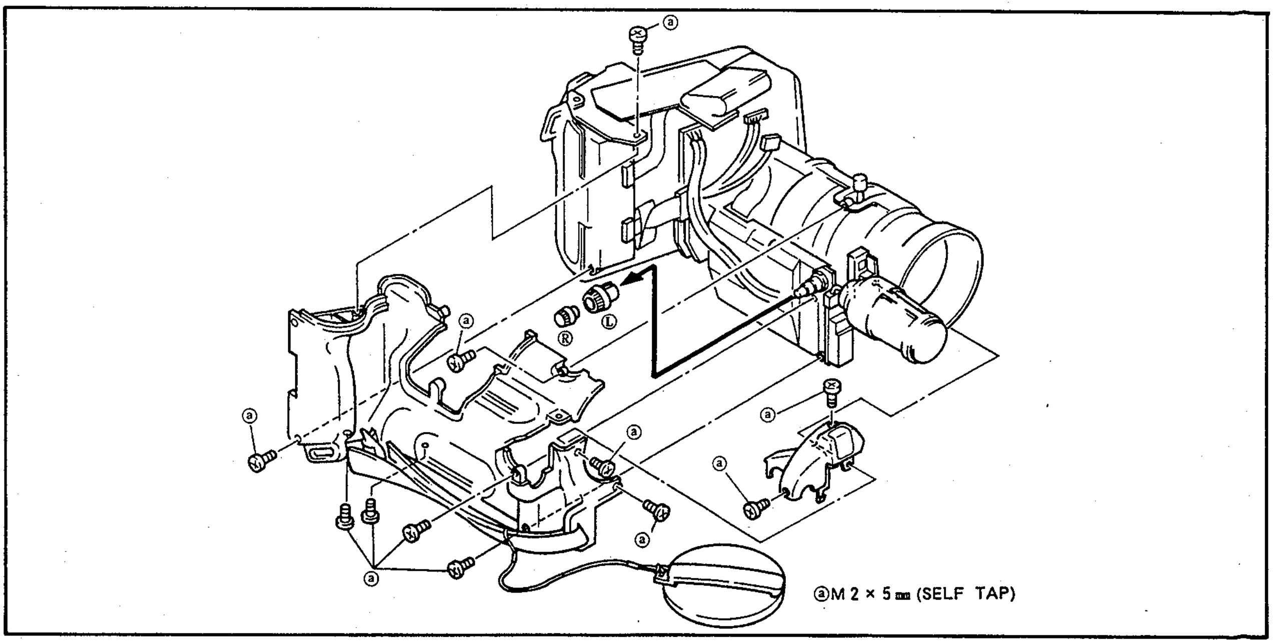

ⓐ
ⓐ
Ⓡ
Ⓛ
ⓐ
ⓐ
ⓐ
ⓐ
ⓐ
ⓐ
ⓐM 2 × 5 mm (SELF TAP)

Fig. II-4

2-1-4 Separation of camera and recorder units

(1) Remove the tape.
(2) Disconnect the CN2111, 2104, 2109 and 2110.
(3) Disconnect the CN1951, 2803 and 2804.
(4) Open the jack lid and remove a screw ⓐ.
(5) Remove three screws ⓑ.
(6) Release the part Ⓐ to separate the camera-unit and the recorder-unit.
(7) Disconnect the CN2408 and 2409.

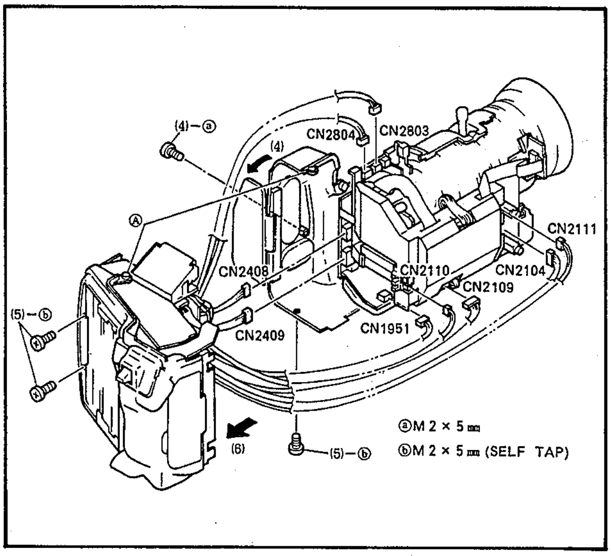

(4)-ⓐ
(4)
CN2804
CN2803
Ⓐ
CN2111
CN2408
CN2110
CN2104
CN2109
(5)-ⓑ
CN2409
CN1951
(6)
(5)-ⓑ
ⓐM 2 × 5㎜
ⓑM 2 × 5㎜ (SELF TAP)

Fig. II-5

2-1-5 Removal of right cover

(1) Turn zoom lever to wide-angle side.
(2) Remove two screws ⓐ.
(3) Remove the right cover.

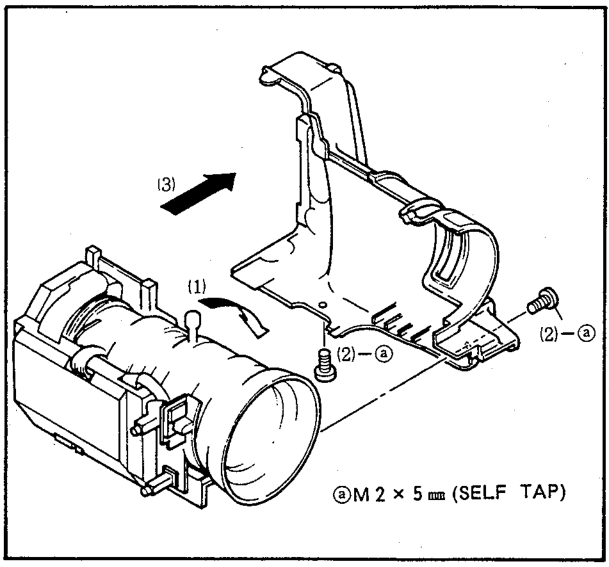

(3)
(1)
(2)-ⓐ
(2)-ⓐ
ⓐM 2 × 5㎜ (SELF TAP)

Fig. II-6

2-1-6 Removal of rear cover

(1) Release the part Ⓑ.
(2) Release four points ⓒ to dismount the rear cover.

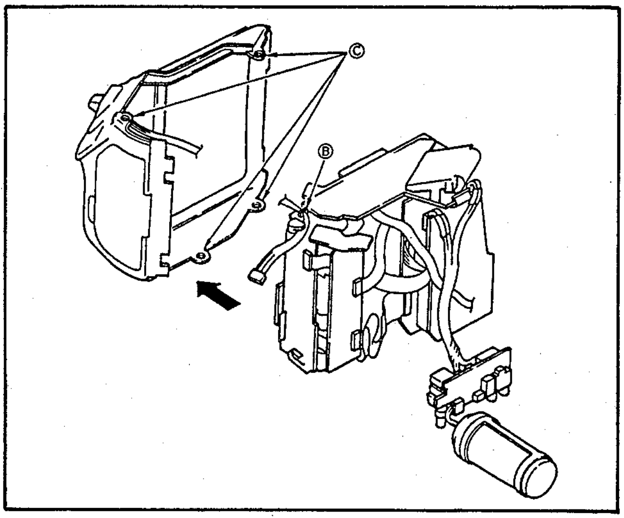


Fig. II-7

2-1-7 Separation of upper cover and EVF-unit

(1) Remove the accessory shoe sheet.
(2) Turn EVF-unit by 60°, and remove four screws ⓐ, and a screw ⓑ.
(3) Separate the upper cover-unit and the EVF-unit.
(4) Remove two screws ⓒ and a screw ⓓ.
(5) Remove the EVF upper cover.

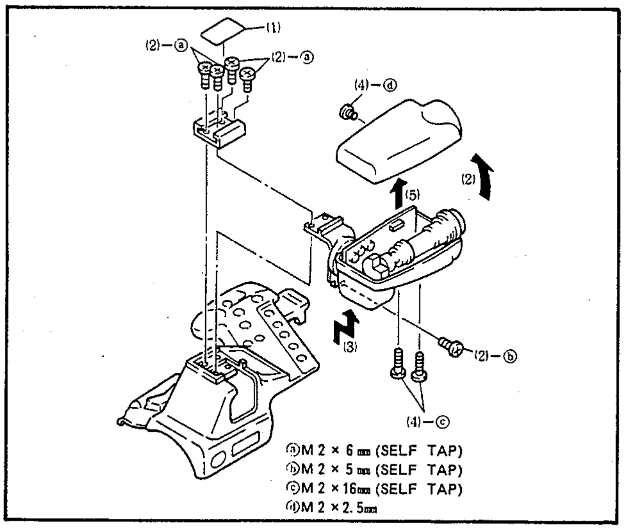

(1)
(2)-ⓐ
(2)-ⓐ
(4)-ⓓ
(2)
(5)
(3)
(2)-ⓑ
(4)-ⓒ
ⓐM 2 × 6㎜ (SELF TAP)
ⓑM 2 × 5㎜ (SELF TAP)
ⓒM 2 × 16㎜ (SELF TAP)
ⓓM 2 × 2.5㎜

Fig. II-8

2-2 Disassembling of camera section

2-2-1 Removal of shield case and AF-KEY C.B.A.

(1) Remove the shield case by unsoldering the part ⓐ, and remove a screw ⓐ.
(2) Remove the shield cases Ⓐ and Ⓑ.
(3) Release the parts Ⓓ and Ⓔ to disconnect the CN2402, 2403, 2404, 2406 and 2106. Then, remove the AF-KEY C.B.A.
(4) Disconnect the CN2101 and 2108, and detach the White Balance Sensor C.B.A.
(5) Separate the AF-KEY C.B.A. and the CAMERA-KEY C.B.A.

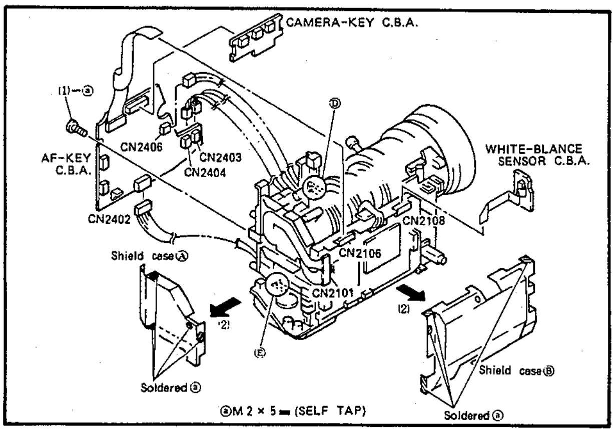

CAMERA-KEY C.B.A.
(1)—ⓐ
Ⓓ
AF-KEY C.B.A.
CN2406
CN2403
CN2404
WHITE-BLANCE SENSOR C.B.A.
CN2402
CN2108
CN2106
Shield caseⒶ
CN2101
(2)
(2)
Ⓔ
Shield caseⒷ
Solderedⓐ
ⓐM 2 × 5㎜ (SELF TAP)
Solderedⓐ

Fig. II-9

2-2-2 Removal of PROCESS C.B.A. and camera holder

(1) Disconnect the CN2103 and 2105.
(2) Unsolder the parts ⓑ between the shield case and the PROCESS C.B.A.
(3) Remove two screws ⓐ, and dismount the PROCESS C.B.A.
(4) Remove the insulation sheet, and dismount the shield case Ⓒ.
(5) Detach the DC/DC converter.
(6) Remove a screw ⓑ, and three screws ⓐ to detach the camera holder.

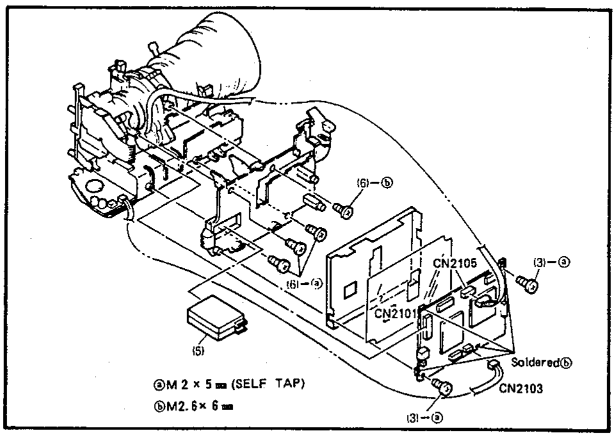

(6)—ⓑ
CN2105
(3)—ⓐ
(6)—ⓐ
CN2101
(5)
Solderedⓑ
ⓐM 2 × 5㎜ (SELF TAP)
ⓑM2.6× 6㎜
CN2103
(3)—ⓐ

Fig. II-10

2-2-3 Removal of BATT holder-unit

(1) To dismount the camera holder, remove four screws ⓐ-(1).
(2) To dismount the BATT holder unit, remove a screw ⓐ-(2).
(3) Remove two screws ⓐ-(3), and dismount the FUSE-BATTERY C.B.A.

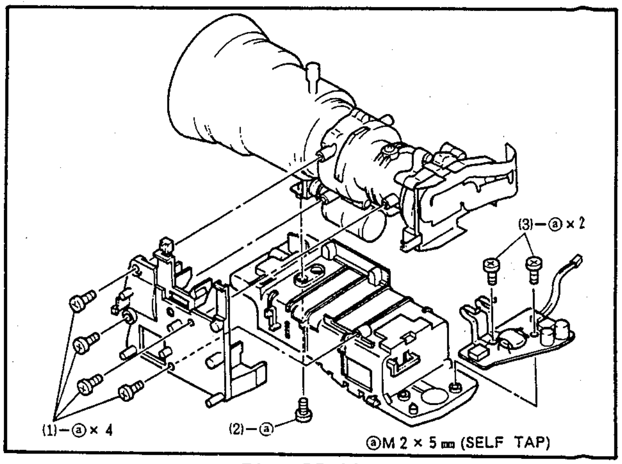

(3)—ⓐ× 2
(1)—ⓐ× 4
(2)—ⓐ
ⓐM 2 × 5㎜ (SELF TAP)

Fig. II-11

2-2-4 Removal of actuator assembly

(1) To detach the shield case, remove two screws ⓐ.
(2) To disconnect the flexible connector, remove two screws ⓑ, and unsolder the CCD pins.
(3) Remove three screws ⓒ, and dismount the actuator assembly.

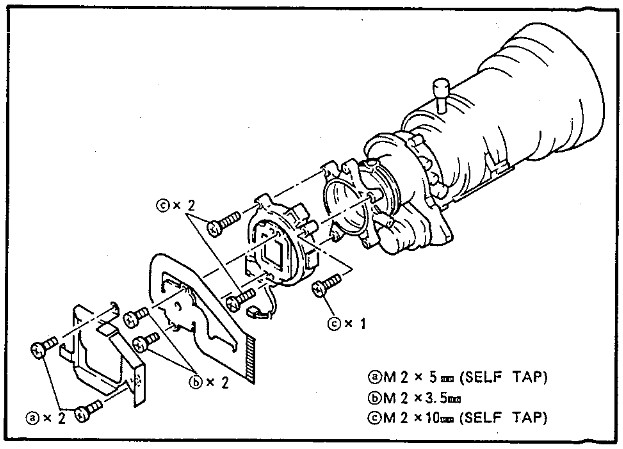

ⓒ× 2
ⓒ× 1
ⓑ× 2
ⓐ× 2
ⓐM 2 × 5㎜ (SELF TAP)
ⓑM 2 × 3.5㎜
ⓒM 2 × 10㎜ (SELF TAP)

Fig. II-12

2-3 Disassembling of lens section

2-3-1 Removal of AF motor, PZ motor, relay lens assembly and IG meter

(1) Remove two screws ⓐ and two screws ⓑ.
(2) Dismount the AF motor and the PZ motor.
(3) Remove a screw ⓒ, and release the PHOTO-REFLECTOR C.B.A.
(4) Remove a screw ⓓ.
(5) Dismount the relay lens assembly.
(6) Remove two screws ⓔ and a screw ⓕ.
(7) Dismount the IG meter.

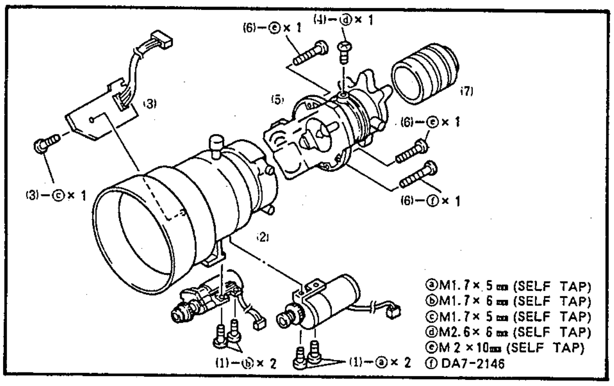

(6)—ⓔ× 1
(4)—ⓓ× 1
(3)
(5)
(7)
(6)—ⓔ× 1
(3)—ⓒ× 1
(6)—ⓕ× 1
(2)
(1)—ⓑ× 2
(1)—ⓐ× 2
ⓐM1.7× 5㎜ (SELF TAP)
ⓑM1.7× 6㎜ (SELF TAP)
ⓒM1.7× 5㎜ (SELF TAP)
ⓓM2.6× 6㎜ (SELF TAP)
ⓔM 2 × 10㎜ (SELF TAP)
ⓕ DA7-2146

Fig. II-13

2-3-2 Removal of zoom motor unit

(1) Detach the rubber ring.
(2) Remove the tape.
(3) Dismount the focus lens assembly.
(4) Release the focusing ring.
(5) Remove three screws ⓐ, and dismount the stopper ring.
(6) Turn the zoom ring assembly toward the telephoto end. Then, dismount it by pulling a macro knob.

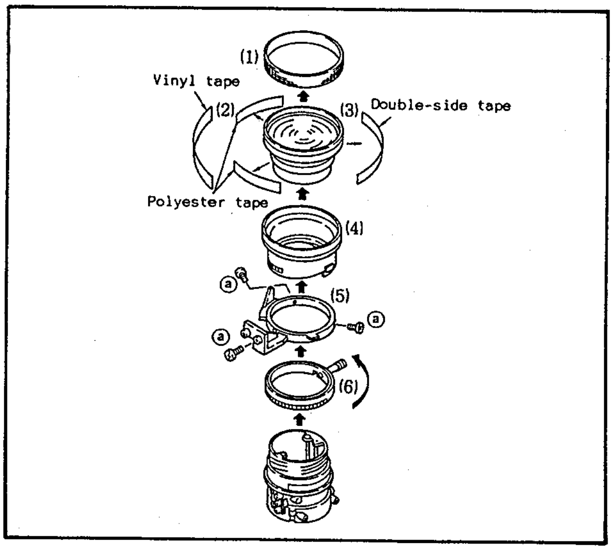

(1)
Vinyl tape
(2)
(3)
Double-side tape
Polyester tape
(4)
ⓐ
(5)
ⓐ
ⓐ
(6)

Fig. II-14

2-3-3 Reassembling of zoom motor unit

Note: After reassembling, perform the focus motor speed adjustment (5-13).

(1) Align the part Ⓐ of zoom ring assembly and the fixed lens barrel, and fit them while pulling the macro knob.
(2) Assemble the stopper ring.
(3) Tighten three screws ⓐ.
(4) Assemble the focusing ring. (with a stopper stopped at the end)
(5) Set the focus lens assembly at the condition of figure Ⓒ. Then, assemble them.
(6) After performing the afocal adjustment (4-1-3), attach the rubber ring.

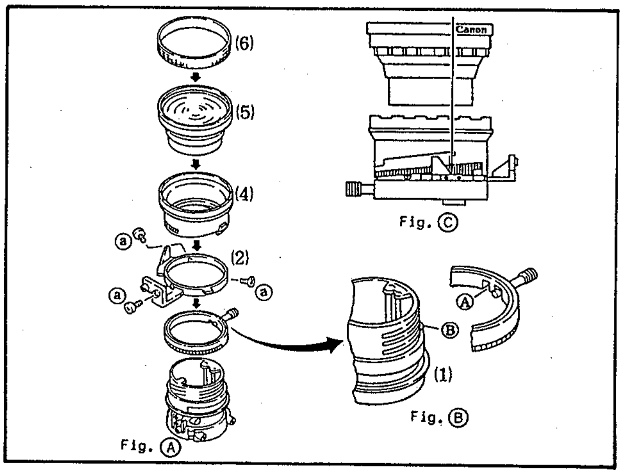

(6)
(5)
(4)
ⓐ
(2)
ⓐ
ⓐ
Fig. Ⓐ
Canon
Fig. Ⓒ
Ⓐ
Ⓑ
(1)
Fig. Ⓑ

Fig. II-15

2-3-4 Oil/grease/bond application positions

After replacement/cleaning of parts, apply the followings to the indicated positions in the Fig. II-16.

(1) Grease GE-C4 (CY9-8045-000).

* Use the Grease GE-C4 (CY9-8045-000) and TEFLON Fluorocarbon Resin MP-102 (DY9-3013-000) together at the following blend:

GE-C4 : MP102
10 : 3 (weight ratio)

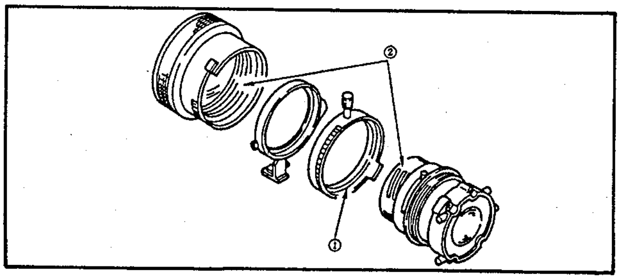


Fig. II-16

2-4 Disassembling of recorder section

2-4-1 Removal of R-KEY 2, VIDEO-SUB and AUDIO-2 C.B.A.s

(1) To detach the R-KEY 2 C.B.A., disconnect the CN1901, and remove a screw ⓐ.

(2) To detach the VIDEO-SUB C.B.A., disconnect the CN1701 and 1702, and remove two screws ⓐ.

(3) To detach the AUDIO-2 C.B.A., remove a screw ⓐ and the VIDEO shield plate 2.

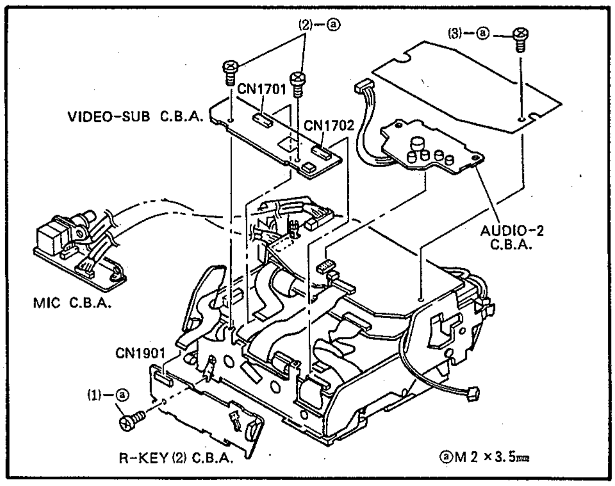

(2)—ⓐ
(3)—ⓐ
CN1701
VIDEO-SUB C.B.A.
CN1702
AUDIO-2 C.B.A.
MIC C.B.A.
CN1901
(1)—ⓐ
R-KEY (2) C.B.A.
ⓐM 2 × 3.5㎜

Fig. II-17

2-4-2 Removal of AUDIO-1 C.B.A.

(1) Disconnect the CN905 and 906, and remove a screw ⓐ.

(2) To detach the AUDIO-1 C.B.A., disconnect the CN208 and 903.

(3) To detach the MIC C.B.A., disconnect the CN901 and 907.

(4) Remove a screw ⓐ, a washer, and the VIDEO shield plate 1.

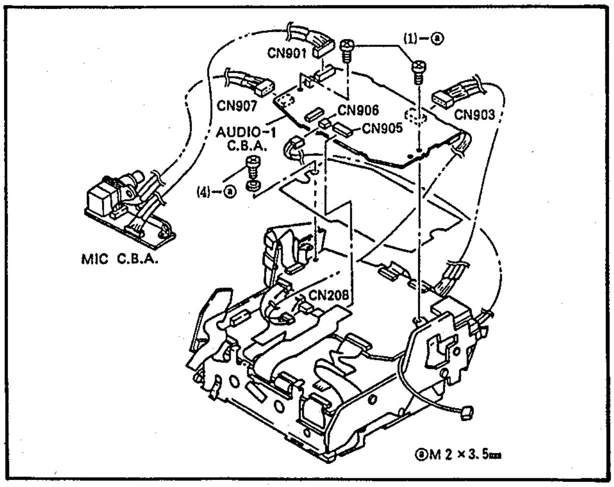

CN901
(1)—ⓐ
CN907
CN906
CN905
CN903
AUDIO-1 C.B.A.
(4)—ⓐ
MIC C.B.A.
CN208
ⓐM 2 × 3.5㎜

Fig. II-18

2-4-3 Removal of VIDEO, TERMINAL, RECORDER-KEY 1 C.B.A.s

(1) Disconnect the CN201, 202, 204, 205, 206, and remove a screw ⓐ.

(2) Dismount the VIDEO C.B.A.

(3) To detach the TERMINAL C.B.A., disconnect the CN1404 and remove two screws ⓐ.

(4) To detach the RECORDER-KEY 1 C.B.A., remove a screw ⓑ and disconnect the CN1607.

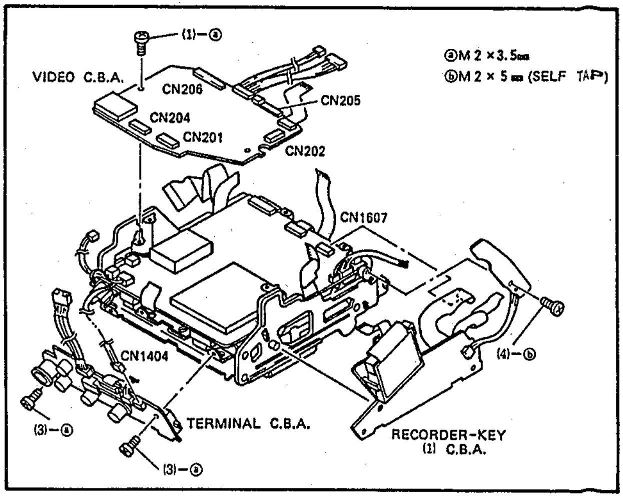

(1)—ⓐ
VIDEO C.B.A.
CN206
CN205
CN204
CN201
CN202
ⓐM 2 × 3.5㎜
ⓑM 2 × 5㎜ (SELF TAP)
CN1607
CN1404
(4)—ⓑ
(3)—ⓐ
TERMINAL C.B.A.
(3)—ⓐ
RECORDER-KEY (1) C.B.A.

Fig. II-19

2-4-4 Removal of RECORDER HOLDERS (1), (2)

(1) To dismount the RECORDER HOLDER (1), remove three screws ⓐ.

(2) To dismount the RECORDER HOLDER (2), remove two screws ⓐ.

(3) Disconnect the CN1606 and 1608.

(4) To detach the capstan connector, disconnect the CN102.

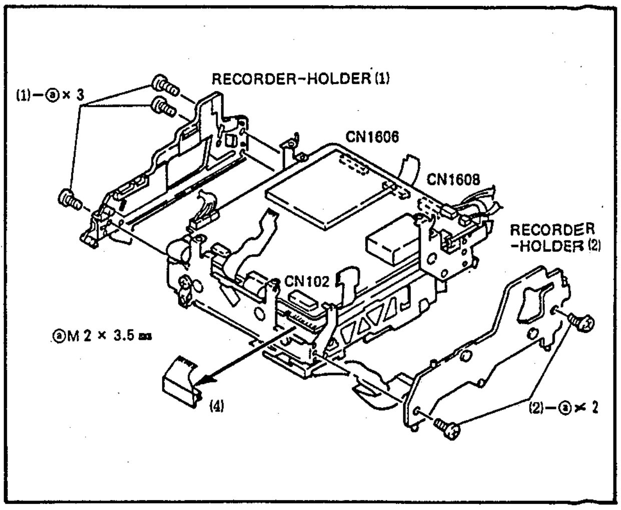

(1)—ⓐ× 3
RECORDER-HOLDER (1)
CN1606
CN1608
RECORDER -HOLDER (2)
CN102
ⓐM 2 × 3.5㎜
(4)
(2)—ⓐ× 2

Fig. II-20

2-4-5 Removal of SYSCON-SERVO C.B.A. and RECORDER HOLDERS (3), (4)

(1) To detach the SYSCON-SERVO C.B.A., disconnect the CN101, 1601, and remove two screws ⓐ.

(2) To dismount the RECORDER HOLDER (3), remove a screw ⓑ.

(3) To dismount the RECORDER HOLDER (4), remove two screws ⓑ.

(4) Disconnect the flexible connectors of drum, and loading motor.

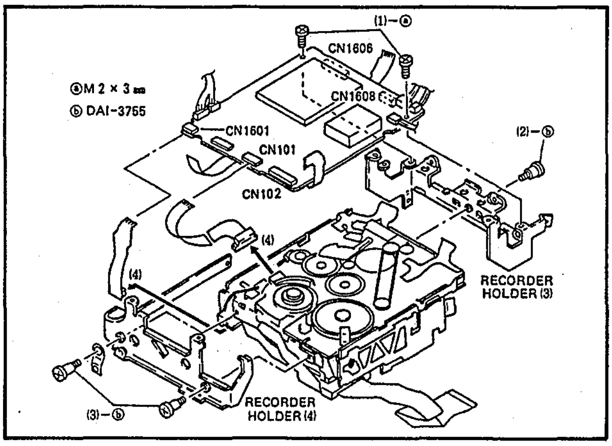

(1)–ⓐ
CN1606
ⓐM 2 × 3 mm
ⓑ DAI-3755
CN1608
CN1601
CN101
(2)–ⓑ
CN102
(4)
(4)
RECORDER HOLDER (3)
(3)–ⓑ
RECORDER HOLDER (4)

Fig. II-21

2-5 Wirings

(1) Camera/Recorder unit

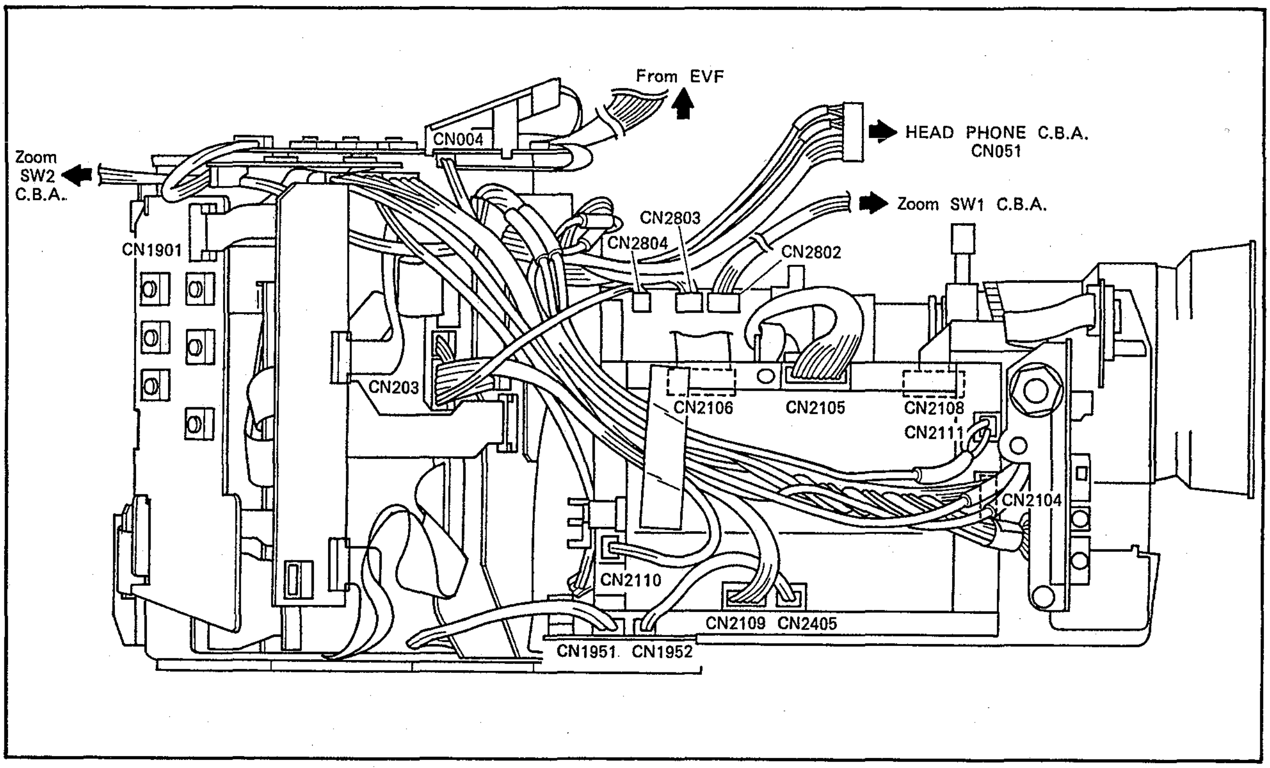

From EVF
HEAD PHONE C.B.A. CN051
Zoom SW2 C.B.A.
CN004
Zoom SW1 C.B.A.
CN2803
CN2804
CN1901
CN2802
CN203
CN2106
CN2105
CN2108
CN2111
CN2104
CN2110
CN2109
CN2405
CN1951
CN1952

Fig. II-22

(2) Recorder unit

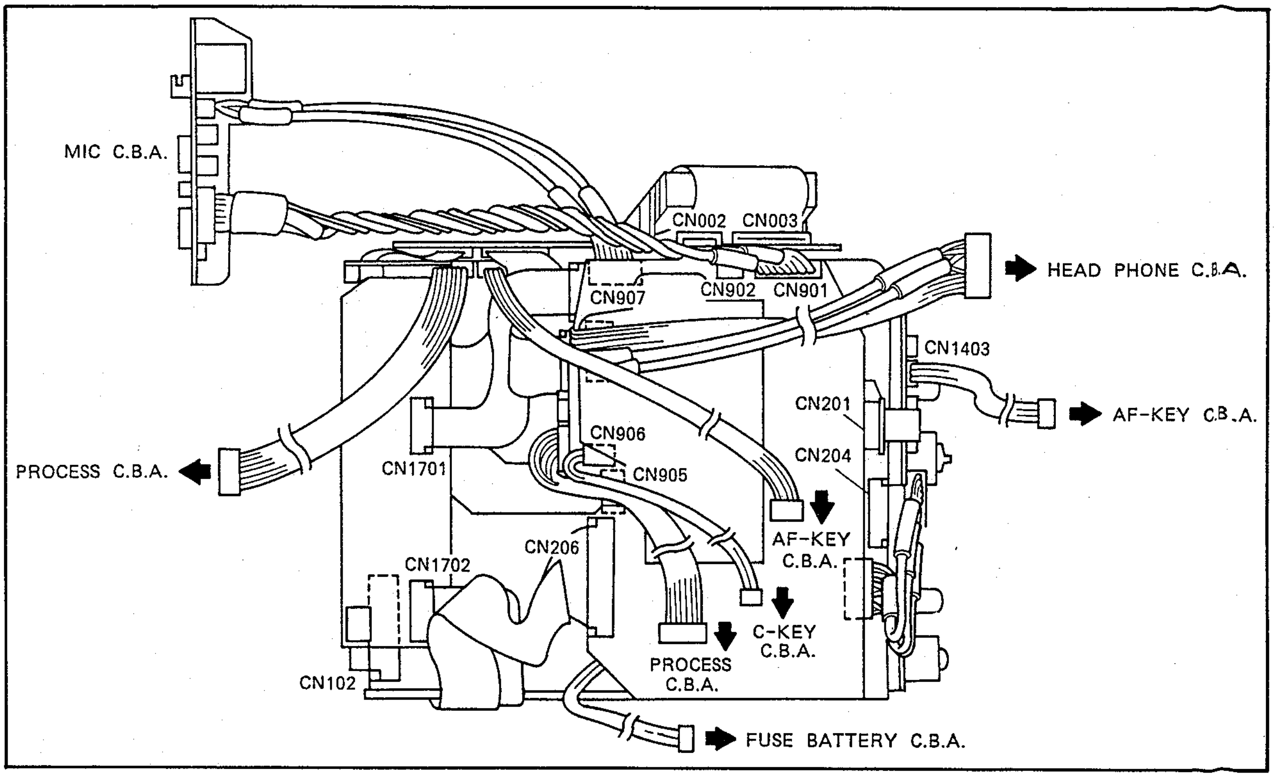

MIC C.B.A.
CN002
CN003
HEAD PHONE C.B.A.
CN907
CN902
CN901
CN1403
AF-KEY C.B.A.
CN201
CN906
CN204
PROCESS C.B.A.
CN1701
CN905
AF-KEY
C.B.A.
CN206
CN1702
C-KEY
C.B.A.
PROCESS
C.B.A.
CN102
FUSE BATTERY C.B.A.

Fig. II-23

(3) SYSCON-SERVO C.B.A.

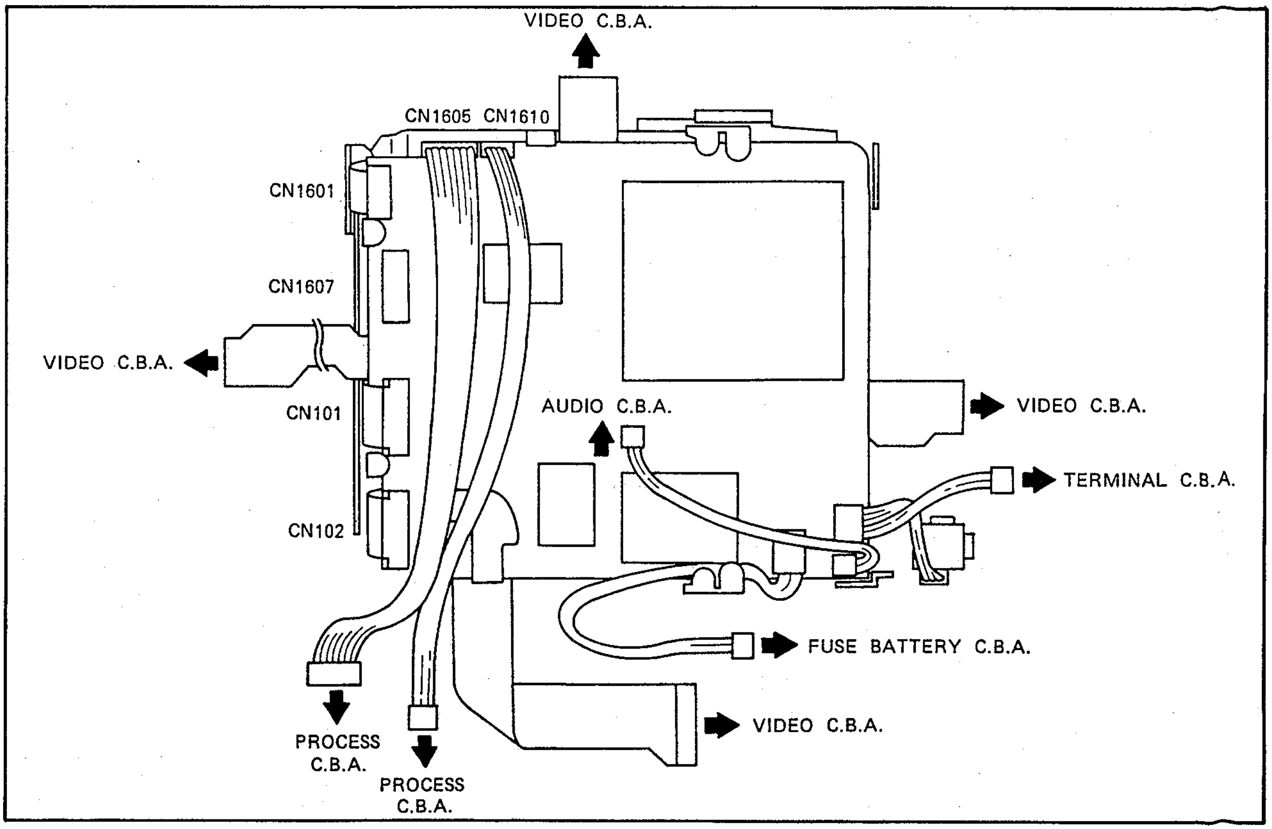

VIDEO C.B.A.
CN1605
CN1610
CN1601
CN1607
VIDEO C.B.A.
CN101
AUDIO C.B.A.
VIDEO C.B.A.
TERMINAL C.B.A.
CN102
FUSE BATTERY C.B.A.
VIDEO C.B.A.
PROCESS
C.B.A.
PROCESS
C.B.A.

Fig. II-24

3. Preparation for Adjustment (Camera/Recorder)

3-1 Preparatory procedure for camera adjustment

3-1-1 Basic setting

(1) Equipments

- ° Y/C MIX AMP II (DY9-1079-001)
- ° Extension cable kit (DY9-1110-000) g, h
- ° Constant voltage power supply (6 V)

(2) Remove the shield case of PROCESS C.B.A. (front side), and connect each cable.

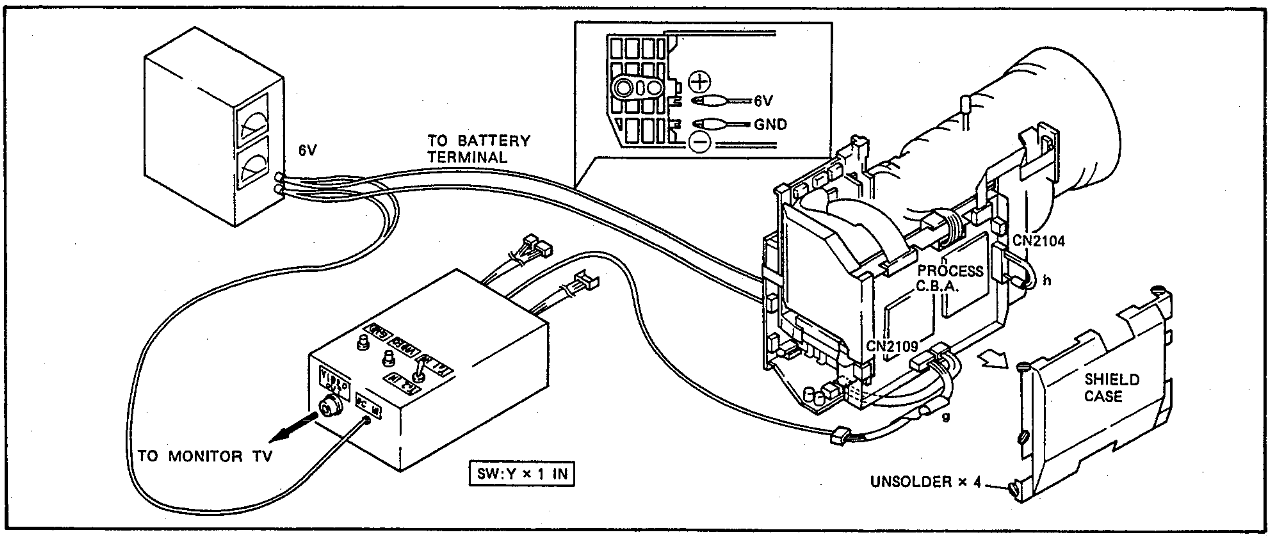

6V
TO BATTERY TERMINAL
6V
GND
CN2104
PROCESS C.B.A.
h
CN2109
SHIELD CASE
g
TO MONITOR TV
SW:Y × 1 IN
UNSOLDER × 4

Fig. II-25

3-1-2 How to open C.B.A.s of camera section

° AF-KEY C.B.A.

(1) Remove a screw.

(2) Unclaw two Ⓐs, disconnect the CN2401, 2405 (B to B) and CN2106 (PROCESS C.B.A.). Then open the AF-KEY C.B.A.

(3) Connect the extension cables b and i so as to check and adjust the rear side of AF-KEY C.B.A.

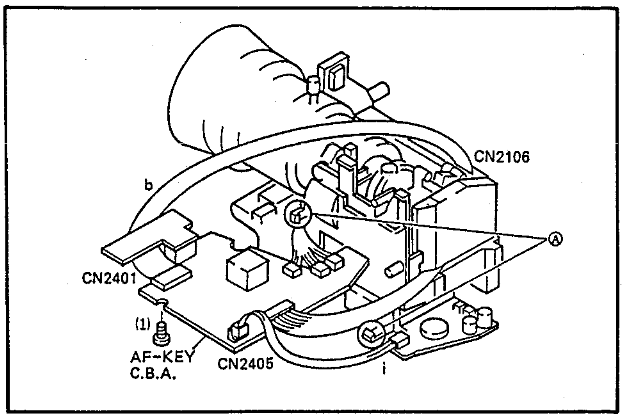

CN2106
b
Ⓐ
CN2401
(1)
AF-KEY C.B.A.
CN2405
i

Fig. II-26

° PROCESS C.B.A.

(1) Remove two screws.

(2) Unsolder four points.

(3) Disconnect the CN2103 to open the C.B.A., then reconnect the CN2103 again.

(4) Connect the extension cable m so as to check the rear side of PROCESS C.B.A.

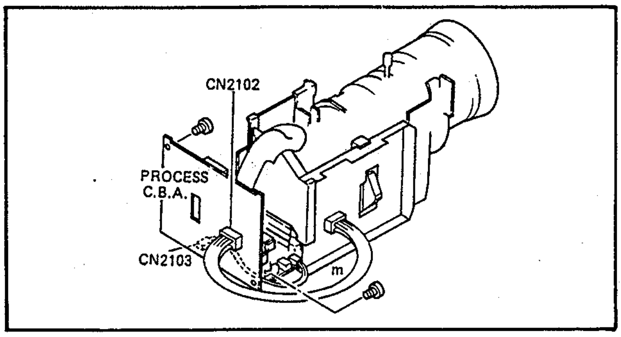

CN2102
PROCESS C.B.A.
CN2103
m

Fig. II-27

3-1-3 AWB・AF (ES threshold level, focus motor speed) adjustment mode

The AWB and AF are automatically adjusted with a microcomputer. By manipulating a camera input key, perform the adjustment.

* As this is done on character display of monitor TV, connect the camera, recorder and EVF.

(1) Setting: Automatic adjustment mode

1) Remove the upper cover, connect the PROCESS C.B.A. TP2228 (ADJ) with GND (shield case), and push the remote control button to indicate the character on the panel. Then proceed with adjustment as instructed.

* Automatic adjustment mode: AWB adjustment and AF adjustment. In this mode, AWB adjustment automatically positions the bright dot at vector center under each specific color temperature.

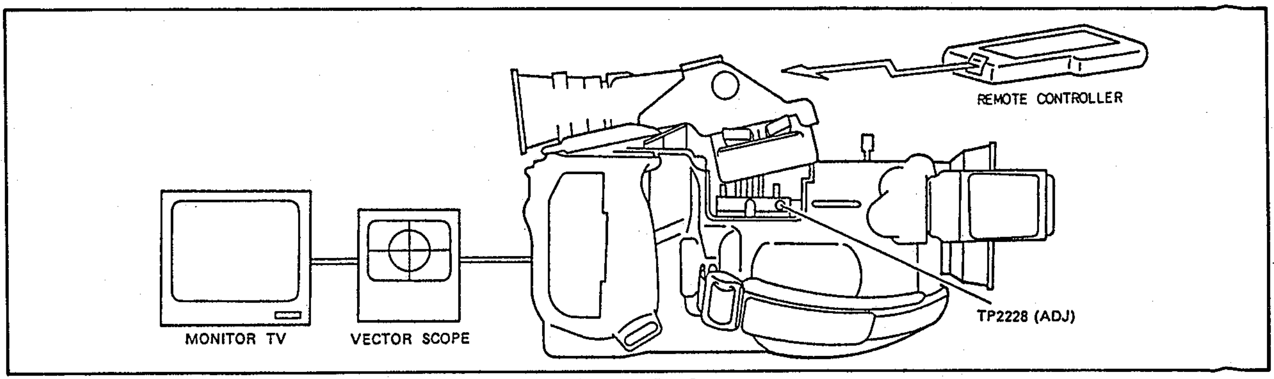


Fig. II-28

(2) Setting: Manual adjustment mode*

1) Remove the upper and left covers, and the PROCESS C.B.A.

2) Remove the R2375 which connects pin 34 of camera microcomputer (IC2205) with GND, and connect pin 34 of camera microcomputer to +5 V. (Pin 34 can be connected with +5 V by short-circuiting unassembled land A).

3) Connect the PROCESS C.B.A. of upper cover.

4) Connect TP2228 with GND. Indicate character on screen by pushing remote control button for the adjustment.

* Manual adjustment mode: Manually locates the bright dot at arbitrary position under specific color temperature of AWB adjustment.

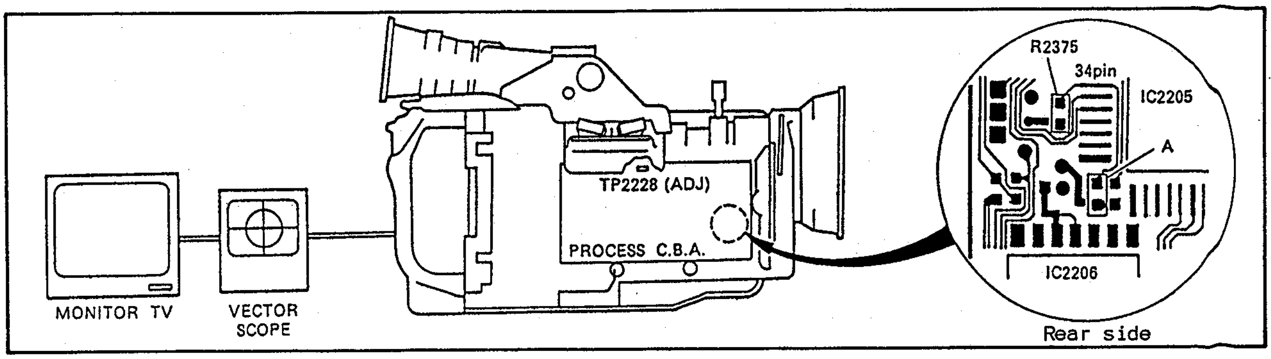


Fig. II-29

(3) Adjustment character display

The following information is displayed in adjustment mode. There are five adjustment steps.

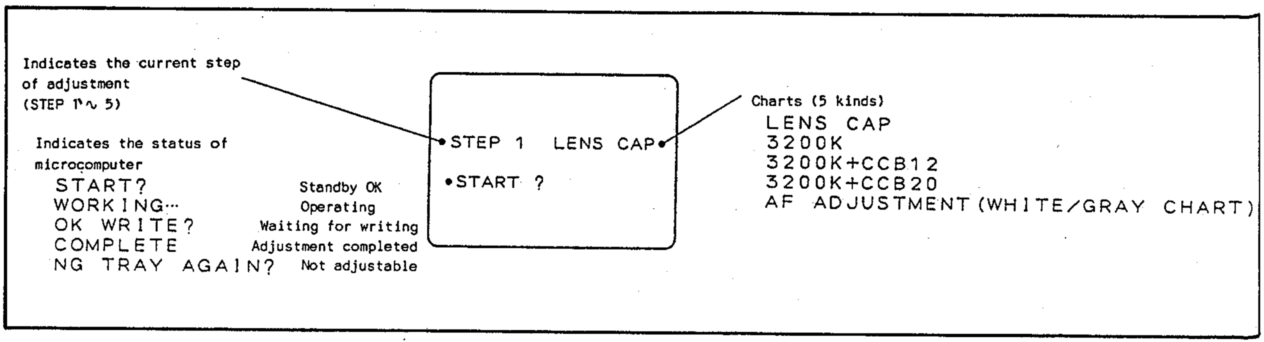

Indicates the current step of adjustment (STEP 1 ∿ 5)
Indicates the status of microcomputer
START? Standby OK
WORKING··· Operating
OK WRITE? Waiting for writing
COMPLETE Adjustment completed
NG TRAY AGAIN? Not adjustable
•STEP 1 LENS CAP•
•START ?
Charts (5 kinds)
LENS CAP
3200K
3200K+CCB12
3200K+CCB20
AF ADJUSTMENT (WHITE/GRAY CHART)

Fig. II-30

(4) Function of camera keys

In adjustment mode, each key camera functions as follows:

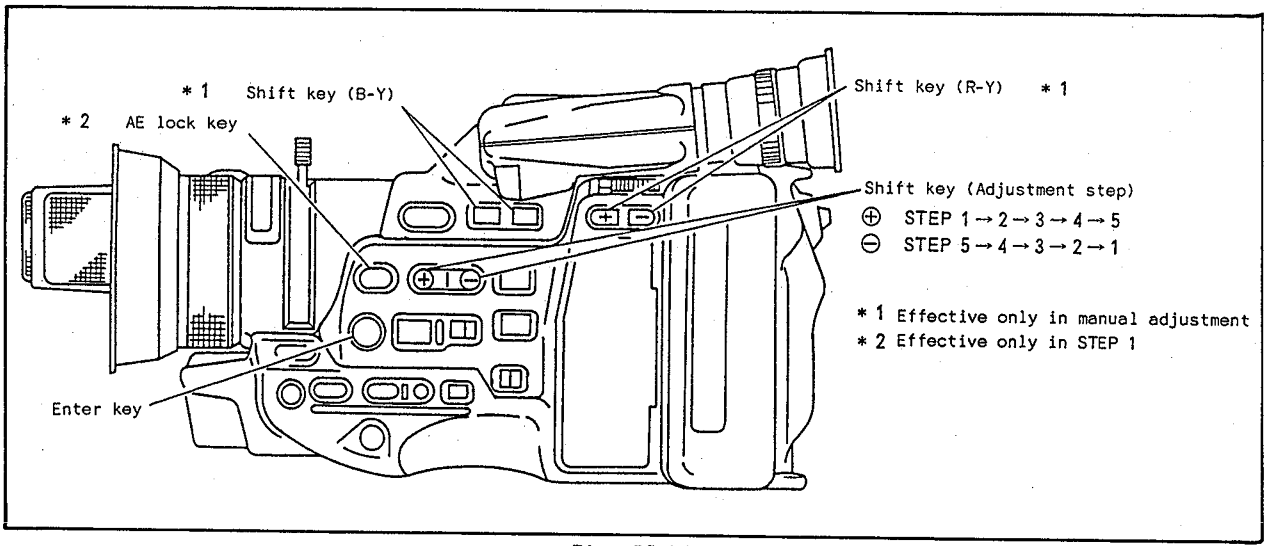

* 1 Shift key (B-Y)
* 2 AE lock key
Shift key (R-Y) * 1
Shift key (Adjustment step)
⊕ STEP 1→2→3→4→5
⊖ STEP 5→4→3→2→1
* 1 Effective only in manual adjustment
* 2 Effective only in STEP 1
Enter key

Fig. II-31

3-1-4 Chart

(1) Fixture (A1 Annex)

Used for AWB adjustment. Set the fixture on the lens front and attach appropriate filter.

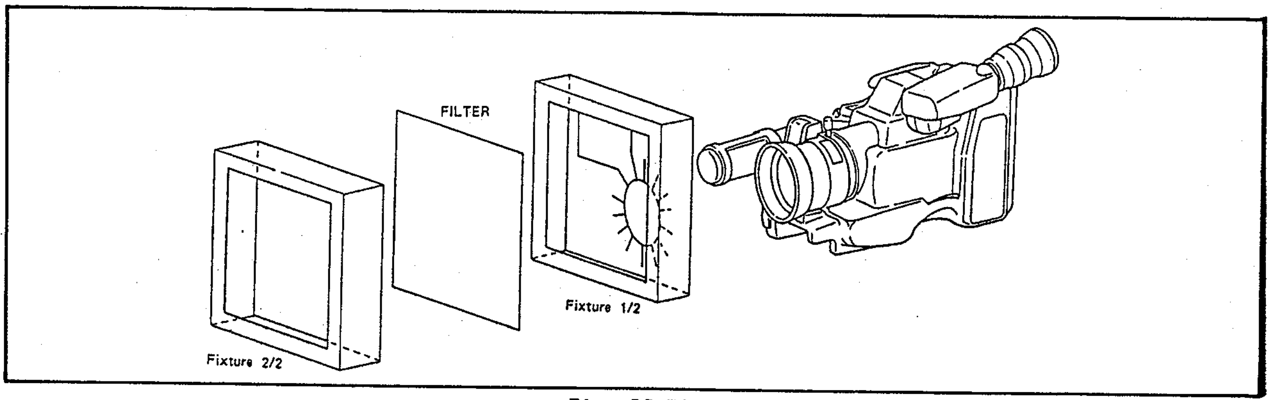

FILTER
Fixture 1/2
Fixture 2/2

Fig. II-32

3-1-5 Other precautions

(1) Prior to each adjustment, energize the equipment for 3 minutes or more.

(2) Use a light box of 5600°K.

(3) "Standard angle of view"

- The "standard angle of view" is given when the charts displayed so as to meet the maximum screen of the full-scan monitor.
- With an oscilloscope, adjust the grayscale (37 µs) and the color bar (54 µs) followed by shooting.
- Shoot the white chart at its center.
- Unless otherwise specified, shooting distance must be 1.4 m (approx.).

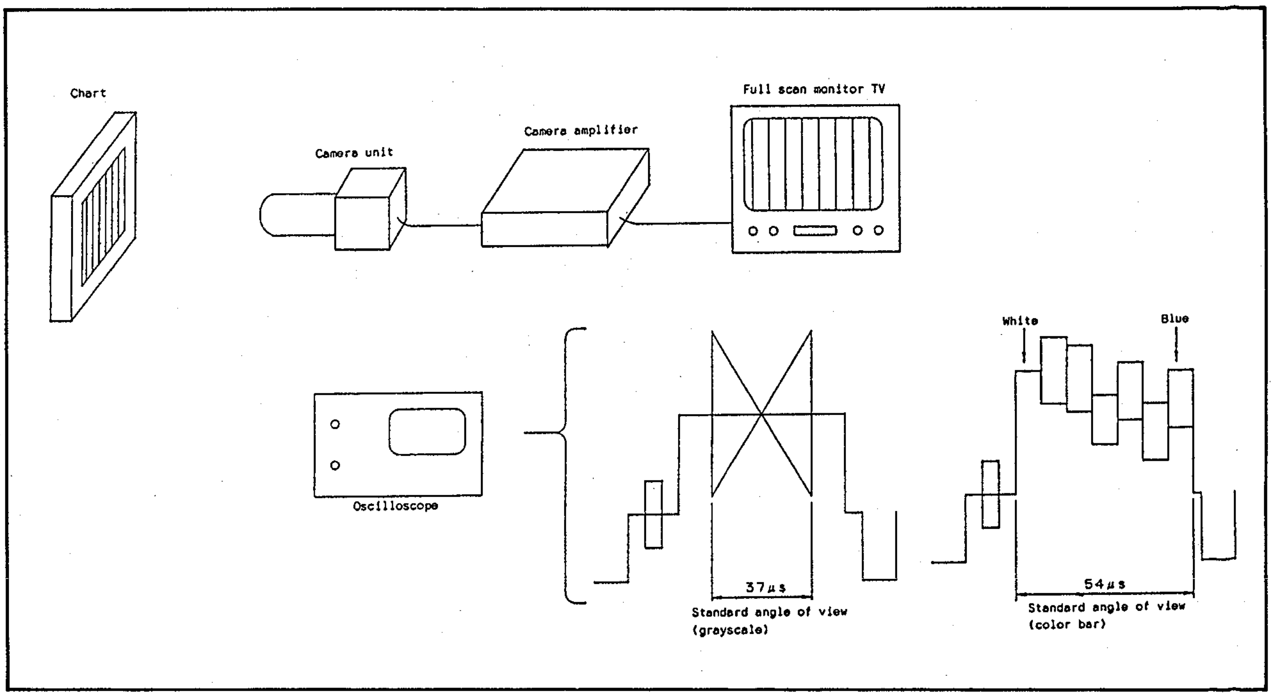


Chart
Camera unit
Camera amplifier
Full scan monitor TV
Oscilloscope
White
Blue
37µs
Standard angle of view (grayscale)
54µs
Standard angle of view (color bar)

Fig. II-33

3-2 Preparatory procedures for recorder adjustment

3-2-1 Basic setting

(1) Equipments

- Y/C separator (DY9-1093-500)
- Extension cable kit (DY9-1110-000) a, c, j, K, 1 and A1's E (DY9-1094-100)
- Constant voltage power supply (6 V)
- Constant voltage power supply (6 V)

(2) Setting 1 (for VIDEO adjustment/operational checking)

1) Remove the AUDIO 1 and 2 C.B.A.s.

2) Supply the power with the extension cable 1 and Y/C signal with j to recorder-unit.

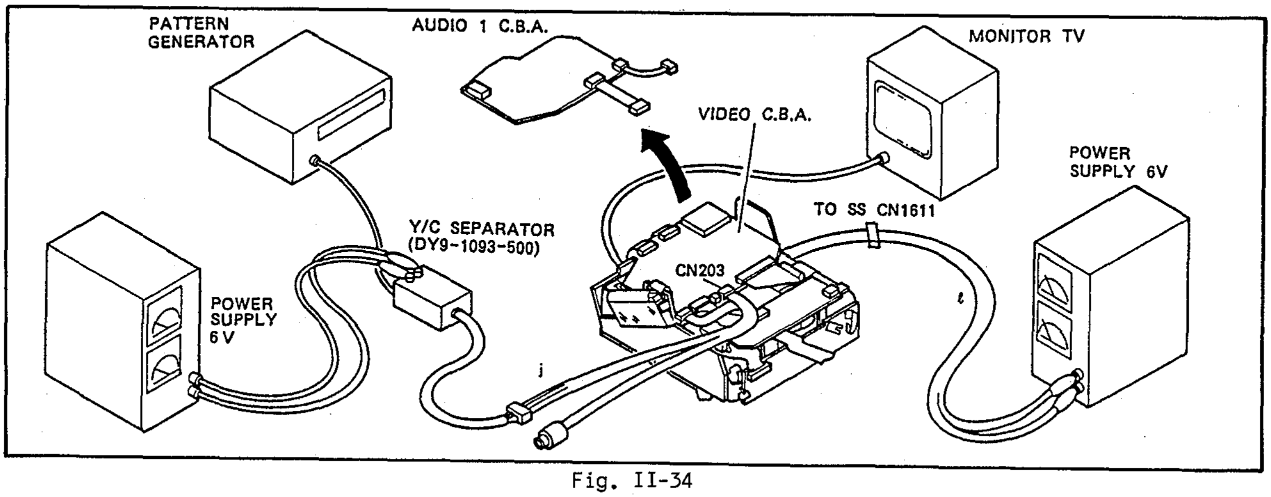

PATTERN GENERATOR
AUDIO 1 C.B.A.
MONITOR TV
VIDEO C.B.A.
POWER SUPPLY 6V
TO SS CN1611
Y/C SEPARATOR (DY9-1093-500)
CN203
POWER SUPPLY 6V
ℓ
j

Fig. II-34

(3) Setting 2 (for character display of SS adjustment)

1) Connect the EVF-unit to the main unit under setting 1 condition by using the extension connector K.

(Thus character is displayed on monitor TV with a wireless remote controller.)

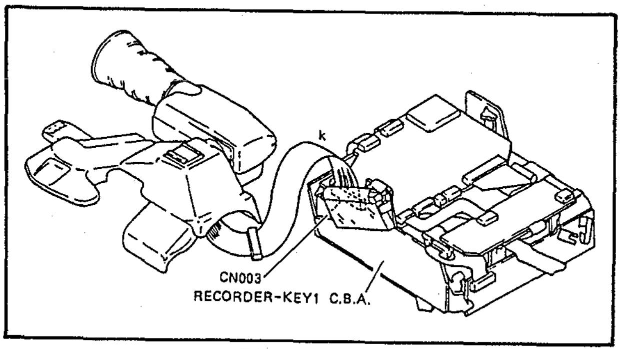

k
CN003
RECORDER-KEY1 C.B.A.

Fig. II-35

(4) Setting 3 (for tape transport • peaking adjsutment)

1) *Under setting 1 condition (take out* of AUDIO C.B.A. and connection of Y/C separator are not necessary), take out PB-RF, Head SW pulse with the A1 extension connector E, and adjust.

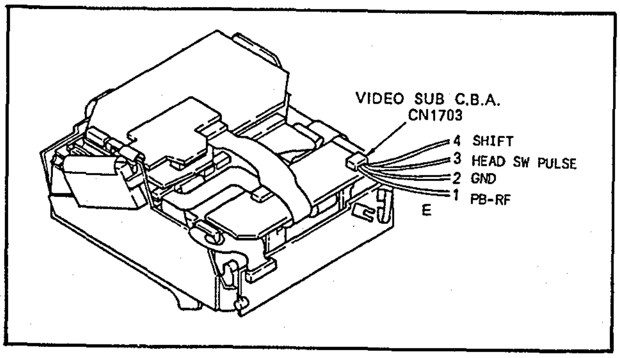

VIDEO SUB C.B.A.
CN1703
4 SHIFT
3 HEAD SW PULSE
2 GND
1 PB-RF
E

Fig. II-36

(5) Setting 4 (for DSP and other operational checkings)

1) By this setting, the camera and recorder units can be adjusted easily with the extension connectors d, e, f (2 pcs.). Camera mode selector: M (manual) position.

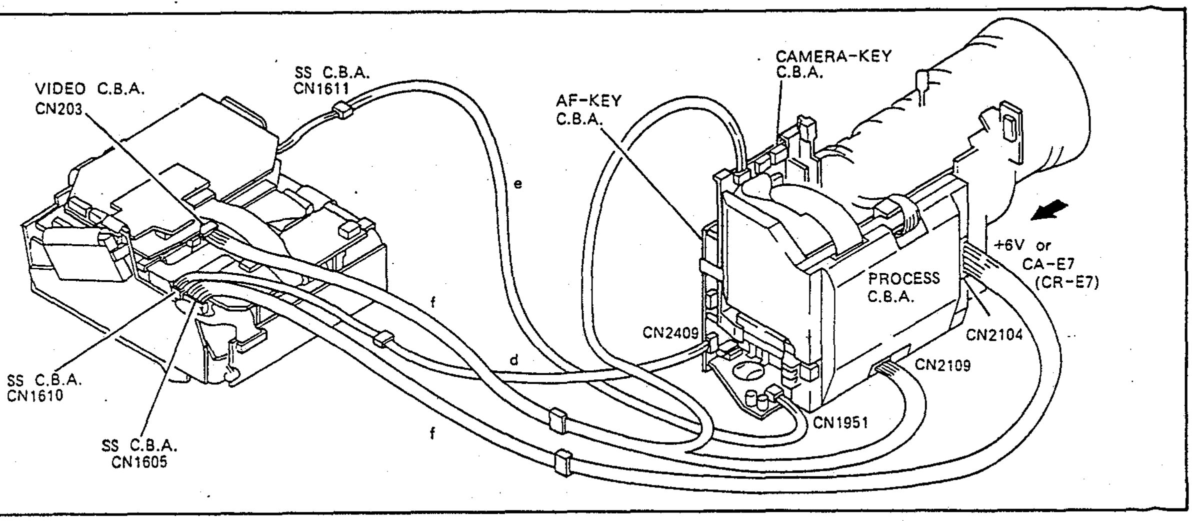

VIDEO C.B.A.
CN203
SS C.B.A.
CN1611
e
AF-KEY
C.B.A.
CAMERA-KEY
C.B.A.
+6V or
CA-E7
(CR-E7)
PROCESS
C.B.A.
CN2104
CN2409
f
d
CN2109
CN1951
f
SS C.B.A.
CN1610
SS C.B.A.
CN1605

Fig. II-37

(6) Setting 5 (for adjusting and operational checking of DSP)

1) Set the setting 4 condition. Then, open the VIDEO C.B.A. with the extension cables a and c. (Remove the TERMINAL C.B.A. once for connecting the extension connector.)

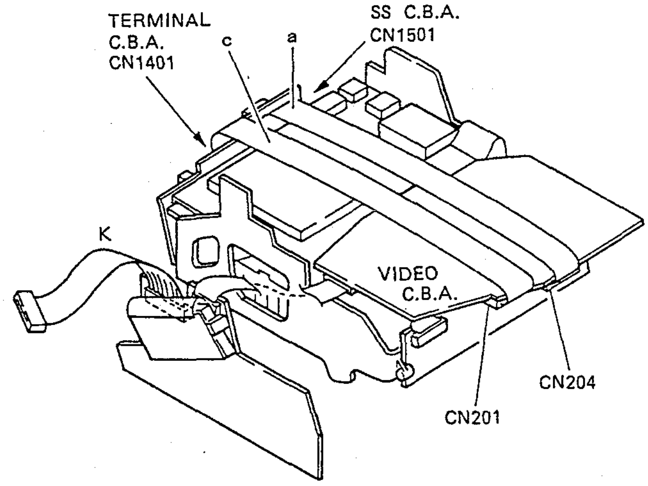

TERMINAL
C.B.A.
CN1401
c
a
SS C.B.A.
CN1501
K
VIDEO
C.B.A.
CN204
CN201

Fig. II-38

3-2-2 How to open C.B.A.s of recorder section

(1) Rear side of VIDEO C.B.A.

1) To open the VIDEO C.B.A., set the setting 4 condition using the extension cables a and c.

(2) Front side of SS C.B.A.

1) To check the DSP, set the setting 5 condition.

2) To check the underneath VIDEO SUB C.B.A., loosen its seating.

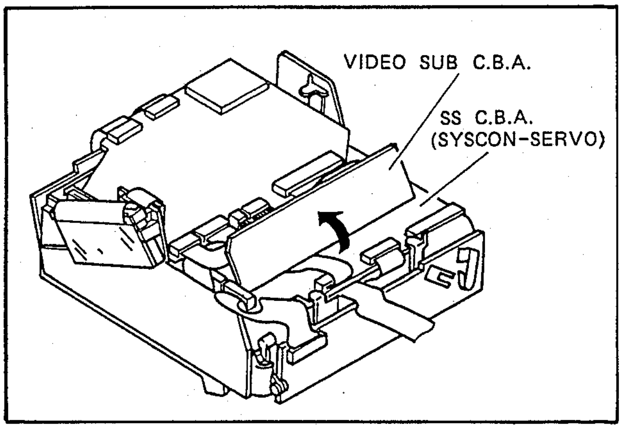

VIDEO SUB C.B.A.
SS C.B.A. (SYSCON-SERVO)

Fig. II-39

(3) Rear side of SS C.B.A.

1) Open the SS C.B.A. using the AI's extension connectors K, L, N and O.

At this time, open the RECORDER-KEY 1 and TERMINAL C.B.A.s.

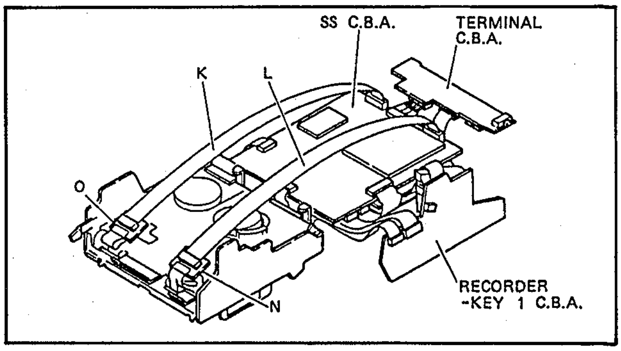

SS C.B.A.
TERMINAL C.B.A.
K
L
O
N
RECORDER -KEY 1 C.B.A.

Fig. II-40

3-2-3 Service modes

This model has service mode for adjustments and operation checks. Activate these modes with the recorder and EVF connected for character display.

During the service modes, the following error detections are cancelled:

- ° Drum rotation error
- ° Capstan rotation error
- ° Reel rotation error

(1) Transition to service mode

There are two methods to set the service mode from the ordinary operation mode.

(Method 1)

Each time TP002 (TEST M) of RECORDER-KEY 1 C.B.A. is connected with TP003 (SS GND), the mode transfers in the following sequence:

Normal → 1 → 2 → 3 → 4 → 5 → 6 → 7 → Normal

* The step No. of service mode is indicated in LCD, too (Fig. II-41).

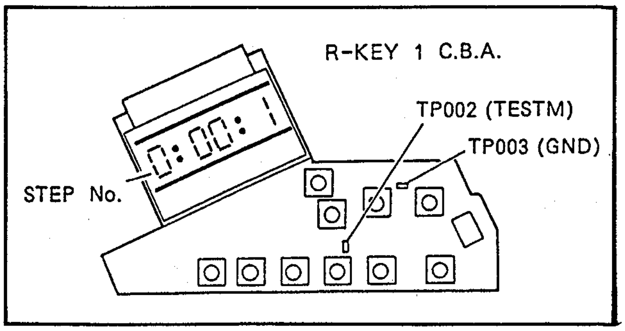

R-KEY 1 C.B.A.
TP002 (TESTM)
TP003 (GND)
STEP No.
0:00: 1

Fig. II-41

(Method 2)

Each time pattern of wireless remote controller (WL-100) is short-circuited, the mode is transferred. Thus operation can be checked without disassembling the body.

Other remote controller may be used in the same manner. (Refer to manual of each product for position of shortcircuit)

The WL-100 is established as service parts. (Refer to the parts catalog section)

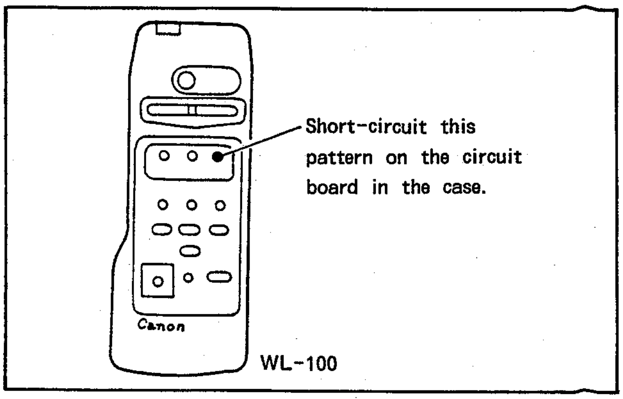

Short-circuit this pattern on the circuit board in the case.
Canon
WL-100

Fig. II-42

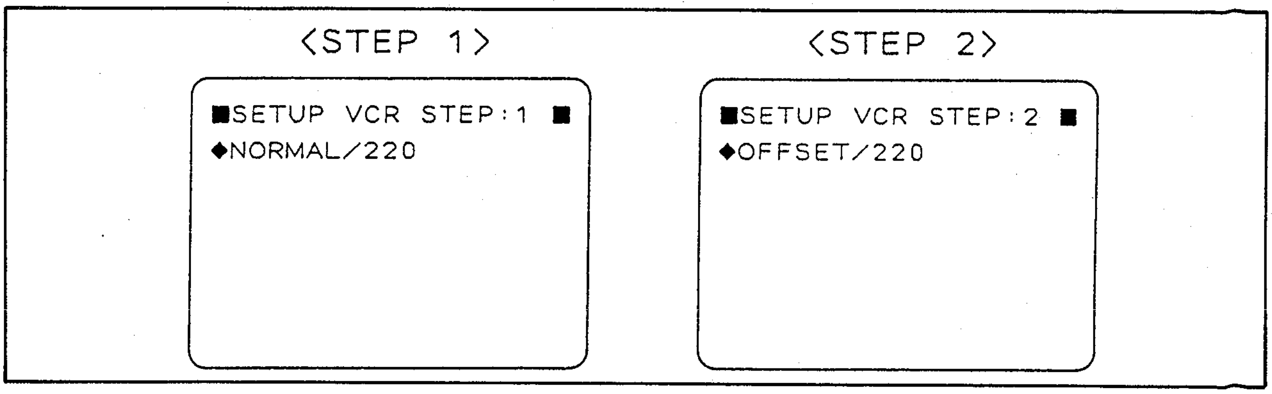
(2) Function of service mode

(Steps 1 and 2)

Mode for the tape transport adjustment. Refer to the MC-4B service manual for more details.

By varying the duty ratio of head switching pulse, 220 degrees of RF envelope can be confirmed.

° Step 1: Ordinary tracking, 100% RF envelope output.
° Step 2: Tracking at offset position, 70% RF envelope output.



<STEP 1>

```
■SETUP VCR STEP:1 ■
◆NORMAL/220
```

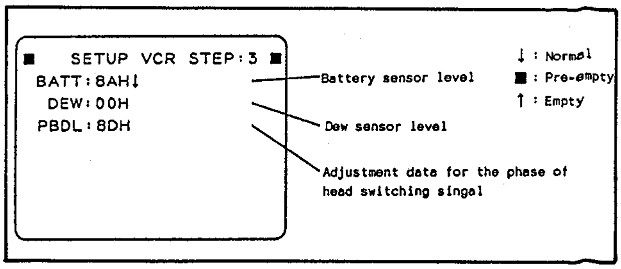
<STEP 2>

```
■SETUP VCR STEP:2 ■
◆OFFSET/220
```

Fig. II-43

(Step 3)

Mode for displaying the A/D converter data. (Hexadecimal notation)
Use this step for the electrical adjustment.



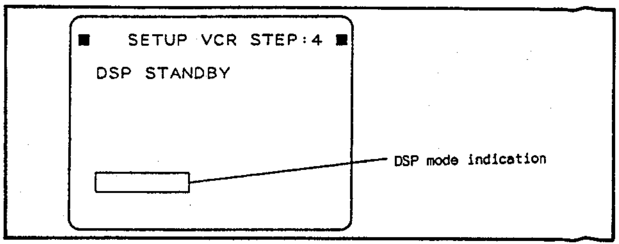
```
■   SETUP VCR STEP:3 ■
 BATT:8AH↓
  DEW:00H
 PBDL:8DH
```

Battery sensor level
Dew sensor level
Adjustment data for the phase of head switching singal
↓ : Normal
■ : Pre-empty
↑ : Empty

Fig. II-44

(Step 4)

Unused.



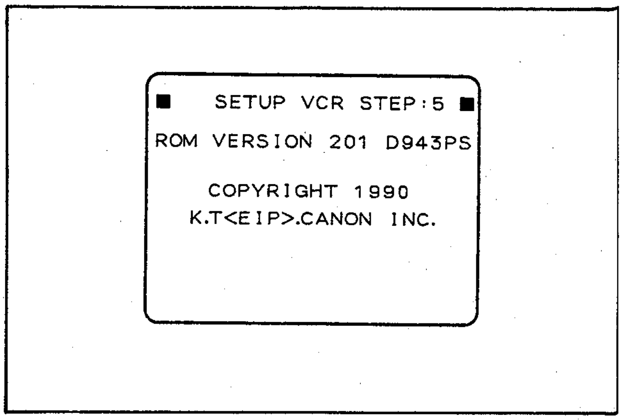
```
■   SETUP VCR STEP:4 ■
 DSP STANDBY
```

DSP mode indication

Fig. II-45

(Step 5)

Mode for displaying the manufacturing version of servo-microcomputer.



```
■   SETUP VCR STEP:5 ■
ROM VERSION 201 D943PS

    COPYRIGHT 1990
  K.T<EIP>.CANON INC.
```

Fig. II-46

(Steps 6 and 7)

This is the internal data. Not applicable to adjustments and operation checks. In the step 7, all LCD lights up.

4. Adjustment of Lens Section

4-1 Optical system

4-1-1 Back focus adjustment

* Note: Open an aperture fully as possible.

CHART	Siemens chart (located 3 m away)
M. EQ.	Monitor TV
TOOL	Phillips screwdriver
ADJ.	Focusing ring, relay lens
SPEC.	Eliminate defocusing at T/W ends

(1) Loosen the screw ⓐ.
(2) With the telephoto-end zoom setting, bring the pattern image into focus by turning the focusing ring.
(3) With the wide-angle end zoom setting, bring the pattern image into focus by moving the relay lens back and forth.
(4) Repeat the above steps (2) and (3) to remove defocusing at the telephoto and wide angle ends.
(5) Tighten the screw ⓐ.

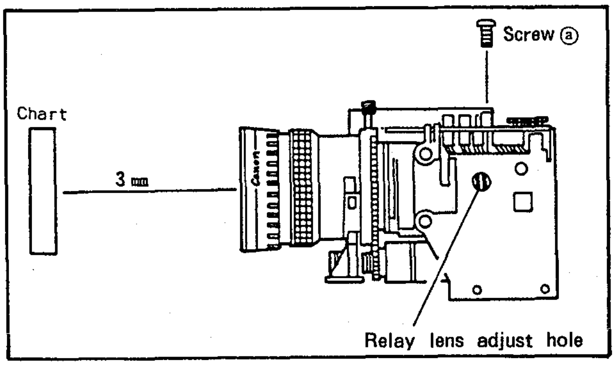


Fig. II-47

4-1-2 Preparation for afocal adjustment

* Note: Carry out this adjustment by using an actual scene (150 m or more, infinity) or a collimator.

Described below is the procedures by using a single-lens reflex camera instead of a collimator.

CHART	Ground glass (30 mm x 40 mm, approx.)
TOOL	Single-lens reflex camera, lens (focal length: 200 mm or more), magnifier

(1) Open an aperture of single-lens reflex camera flully.
Then, open a rear lid.

* Note: If the shutter equips the valve mechanism, lock it for opening the aperture.
If not, (e.g. Canon T series, etc.), open the aperture by using the slow shutter and take out the internal battery while the shutter is opened.

(2) Secure the ground glass to the inside rail face by pressing it. At this step, the ground surface must be faced the lens side.
(3) Shoot a scene at infinity, to check if it is in best focus, enlarge the image on the ground glass by a magnifier.

* Note: Distance for infinity: See the Fig. II-48.

(4) After the above checking, remove the ground glass once, and mark cross hairlines on it.
Then, attach it to the camera again.

* Remarks: Using a collimator as above, the back focus adjustment (T/W zoom correction) can be performed with high accuracy in a short time.

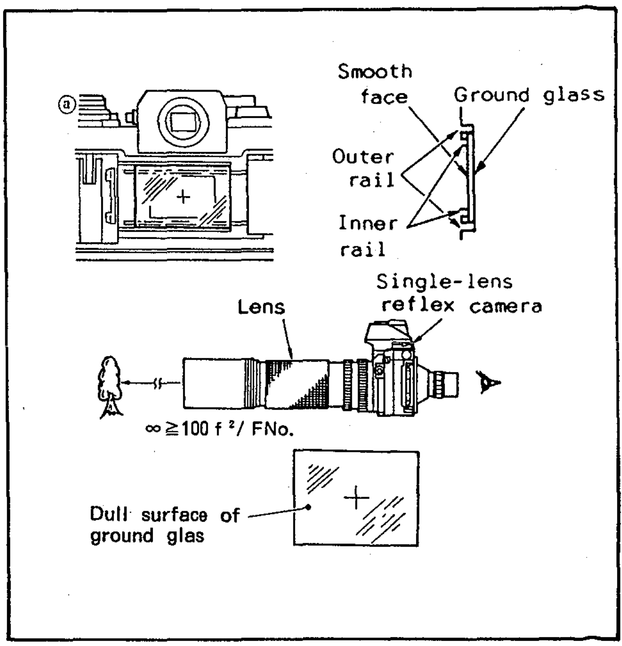


Fig. II-48

4-1-3 Afocal adjustment

* Note: Perform this adjustment only when the focus lens assembly is replaced or disassembled.

Described below is the procedures by using a single-lens reflex camera instead of a collimator.

CHART	Ground glass (30 mm x 40 mm, approx.)
M. EQ.	Monitor TV
TOOL	Single-lens reflex camera, lens (focal length: 200 mm or more), phillips screwdriver, adjuster (1.8 mm)
ADJ.	Focusing lens, relay lens
SPEC.	Eliminate defocusing at T/W ends*. (*7.5 mm before the ends)

(1) Oppose the camera unit correctly with the collimator.
At this time, align an optical axis between the two lenses as possible.

(2) Detach a rubber ring and tapes. Then, loosen the screw ⓐ.

(3) At telephoto-end, adjust focus by using the front lens.
(At this time, hold the focusing ring 1.5 mm before the infinity stopper end, and turn only the front lens.)

(4) At wide-angle end, move the relay lens back and forth to bring the image into best focus.

(5) Repeat the steps (3) and (4) to eliminate the defocusing at the telephoto and wide angle ends.

(6) Tighten the screw ⓐ.
Then apply the tape. (4 points) (DY9-3002-000)

(7) Check if the defocusing is elimianted.

(8) Apply a double-sided tape on the ring surface, and attach the rubber ring.

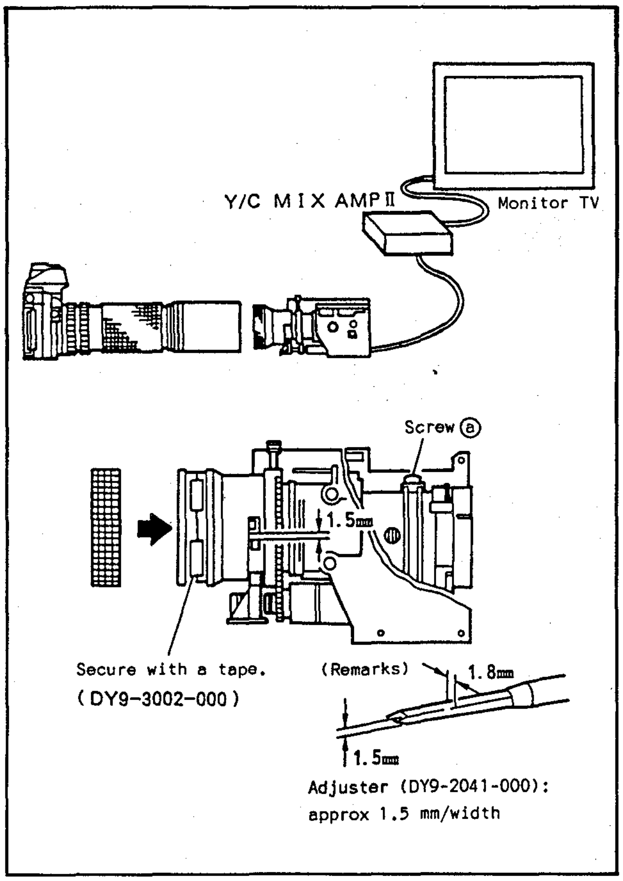


Fig. II-49

4-2 AF adjustment

4-2-1 Clock adjustment

MODE	AF
M. EQ.	Oscilloscope
TP/TRIG.	AF C.B.A. TP2405 (AF FLAME)/ TP2403 (HD)
ADJ.	AF C.B.A. VC2401 (CLOCK)
SPEC.	26 ± 0.5 μs

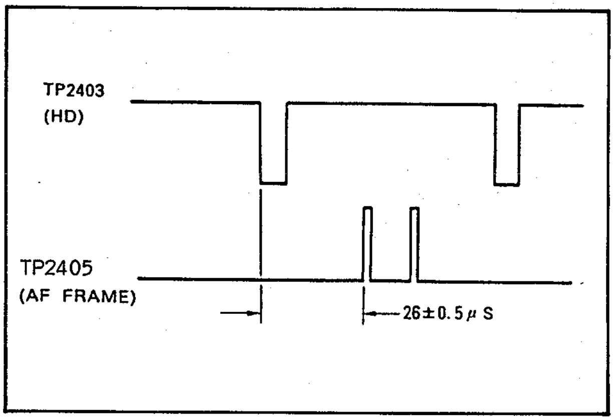


Fig. II-50 10 μS/0.2 V

4-2-2 ES offset adjustment

CHART	Lens capped
MODE	AF, AE lock
M. EQ.	Digital voltmeter
TP/TRIG.	AF C.B.A. TP2401 (+1.8 V) TP2402 (DIV. OUT)
ADJ.	AF C.B.A. VR2401 (OFFSET)
SPEC.	0 ± 10 mV

Procedures:

(1) Shoot a grayscale chart. Then, lock the AE.

(2) Cap the lens.

(3) Connect a digital voltmeter as follows, and perform the adjustment.
TP2402: Adjustment side
TP2401: GND side

4-2-3 Piezo drive adjustment

MODE	Manual Focus
M. EQ.	Oscilloscope
TP/TRIG.	AF C.B.A. TP2414 (PIEZO)
ADJ.	AF C.B.A. VR2402 (PIEZO)
SPEC.	15 ± 0.5 V

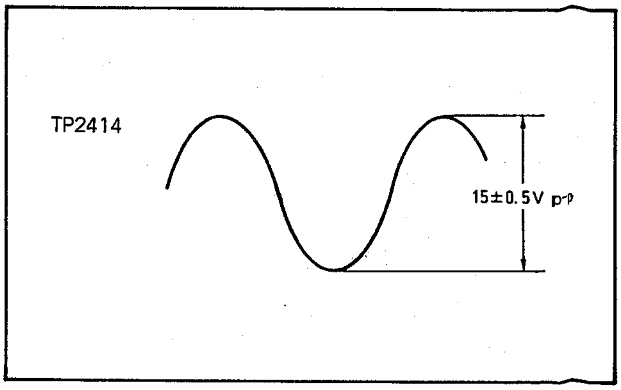


Fig. II-51 10 mS/0.5 V

4-2-4 Focus motor speed/ES threshold level adjustment

The focus motor speed and the ES threshold level are automatically adjusted by a microcomputer. (Refer to the explanation of AWB・AF adjustment mode in p. II-25.)

* Note: If you perform the AF adjustment independently, skip the steps 1, 2, 3 and 4 by pushing the ⊕ or ⊖ button.

5. Electrical Adjustments (Camera Section)

* Note: For adjustments from 5-5 through 5-12, set the PRESET mode. To set it, connect TP2214 (PRESET) to ground.

5-1 Clock frequency adjustment

M. EQ.	Frequency counter (Connect via an oscilloscope)
TP/TRIG.	PRO C.B.A. TP2105 (CLOCK)
ADJ.	PRO C.B.A. VC2101 (CLOCK)
SPEC.	14.18750 MHz ± 30 MHz

5-2 PLL adjustment

M. EQ.	Digital voltmeter
TP/TRIG.	PRO C.B.A. TP2104 (PLL)
ADJ.	PRO C.B.A. VC2102 (PLL)
SPEC.	2.5 ± 0.1 V

5-3 V SUB adjustment

M. EQ.	Digital voltmeter
TP/TRIG.	PRO C.B.A. TP2101 (V SUB)
ADJ.	PRO C.B.A. VR2101 (V SUB)
SPEC.	Set DC voltage to CCD rating. Tolerance: ± 0.1 V

* Note: For the CCD rating, refer to Fig. II-53.

5-4 V RGL adjustment

M. EQ.	Oscilloscope
TP/TRIG.	PRO C.B.A. TP2102 (RG)
ADJ.	PRO C.B.A. VR2102 (V RGL)
SPEC.	Set lower DC voltage of RG pulse to CCD rating. Tolerance ± 0.1 V

* Note: For the CCD rating, refer to Fig. II-53.

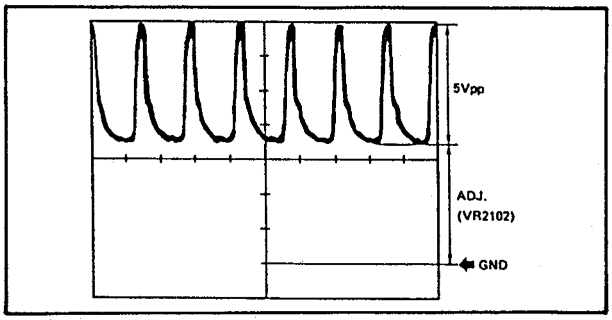


Fig. II-52 50 nS/0.1 V (DC)

5-5 IRIS encoder adjustment

M. EQ.	Digital votlmeter
TP/TRIG.	PRO C.B.A. TP2211 (IRIS POSITION)

1) CLOSE voltage

MODE	IRIS CLOSE TP2222 (IRIS O/C) ↔ GND
ADJ.	PRO C.B.A. VR2203 (OFFSET)
SPEC.	0.80 ± 0.02 V

2) OPEN voltage

MODE	IRIS OPEN (Lens-capped)
ADJ.	PRO C.B.A. VR2214 (GAIN)
SPEC.	2.80 ± 0.02 V

* Notes: 1. Do not use a MANUAL IRIS key.
2. To obtain the specification, repeat iris opening/closing.

5-6 Auto iris adjustment

CHART	Grayscale (5600°K)
MODE	TP2214 (PRESET) ↔ GND
M. EQ.	Oscilloscope
TP/TRIG.	PRO C.B.A. TP2208 (YS)/TP2204 (ID)
ADJ.	PRO C.B.A. VR2201 (IRIS)
SPEC.	250 ± 10 mV

* Note: After the adjustment, confirm the specification by covering the lens surface with palm.

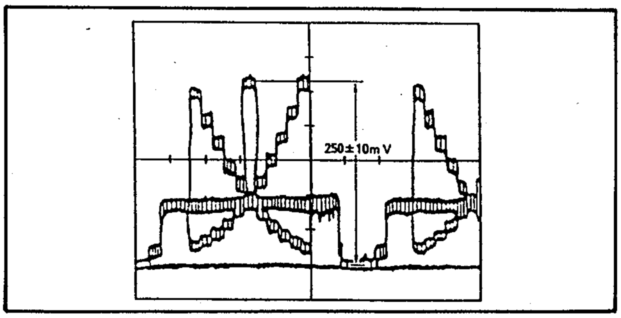
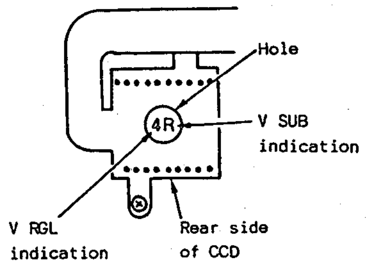


Fig. II-54 10 μS/5 mV



V REG indication	0	1	2	3	4	5	6	7	8	9
Voltage [V]	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0

V SUB indication	E	F	G	H	J	K	L	M	N	P
Votlage [V]	9.0	9.5	10.0	10.5	11.0	11.5	12.0	12.5	13.0	13.5

Q	R	S	T	U	V	W	X	Y	Z
14.0	14.5	15.0	15.5	16.0	16.5	17.0	17.5	18.0	18.5

Fig. II-53

5-7 Y AGC adjustment

CHART	Grayscale (5600°K)
MODE	TP2214 (PRESET) ←→ GND
M. EQ.	Oscilloscope
TP/TRIG.	PRO C.B.A. TP2202 (Y AGC)/ TP2204 (ID)
ADJ.	PRO C.B.A. VR2202 (AGC)
SPEC.	200 ± 10 mV

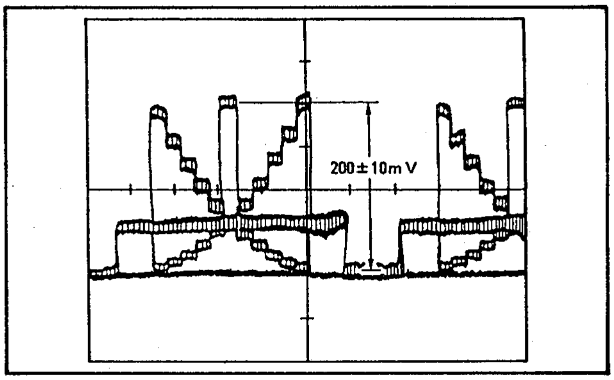


Fig. II-55 10 µS/5 mV

5-8 Y LEVEL adjustment

CHART	Grayscale (5600°K)
MODE	TP2214 (PRESET) ←→ GND
M. EQ.	Oscilloscope
TP/TRIG.	PRO C.B.A. TP2213 (Y OUT)/ TP2204 (ID)
ADJ.	PRO C.B.A. VR2213 (Y LEV.)
SPEC.	700 ± 40 mV

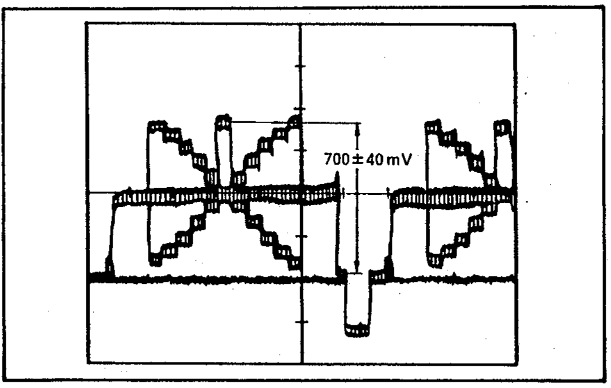


Fig. II-56 10 µS/20 mV

5-9 C2H LEVEL adjustment

CHART	Color bar (5600°K)
MODE	TP2214 (PRESET) ←→ GND
M. EQ.	Vectorscope
ADJ.	PRO C.B.A. VR2204 (C2 GAIN) VR2212 (HUE)
SPEC.	° Each dots to be together Dot split toleance: Phase; within 5° Gain ; 10% ° Burst phase: 135 ±2°

Procedures:

(1) Adjust the burst phase to 135 ±2° by VR2212.

(2) Put each bright dot on another by VR2204.

5-10 C LEVEL adjustment

CHART	Grayscale (5600°K)
MODE	TP2214 (PRESET) ←→ GND TP2210 (OFFSET) ←→ GND
M. EQ.	Oscilloscope
TP/TRIG.	PRO C.B.A. TP2209 (G OUT)/ TP2204 (ID)
ADJ.	PRO C.B.A. VR2211 (C LEV.)
SPEC.	400 ± 20 mV

* Note: Connect TP2210 to ground.

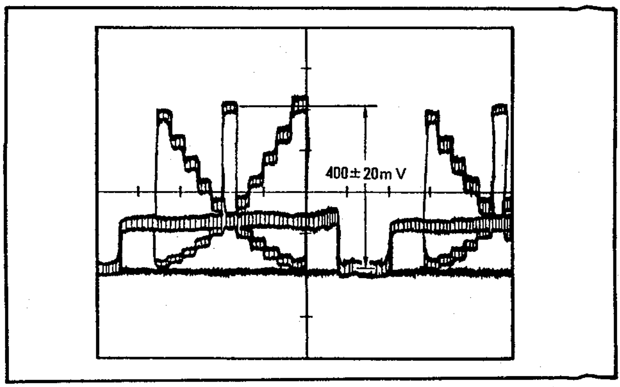


Fig. II-57 10 µS/10 mV

5-11 Carrier balance adjustment

* Notes: 1. Set TP2210 to OPEN state.
2. Turn a zoom setting from the standard angle of view to a wide angle for the adjustment. (Fig. II-58)

CHART	Color bar (5600°K) See Fig. II-58.
MODE	TP2214 (PRESET) ↔ GND
M. EQ.	Vectorscope
ADJ.	PRO C.B.A. VR2203 (R CB)/ VR2214 (B CB)
SPEC.	Bright dot (dark part) to be centered

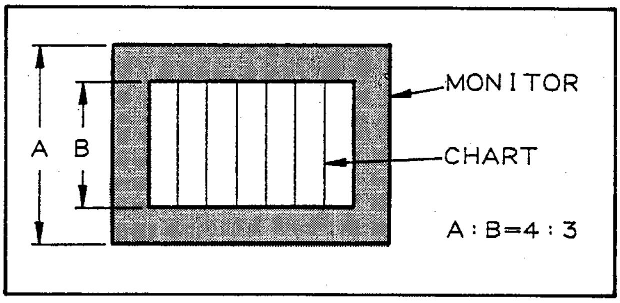

MONITOR
CHART
A
B
A : B=4 : 3

Fig. II-58

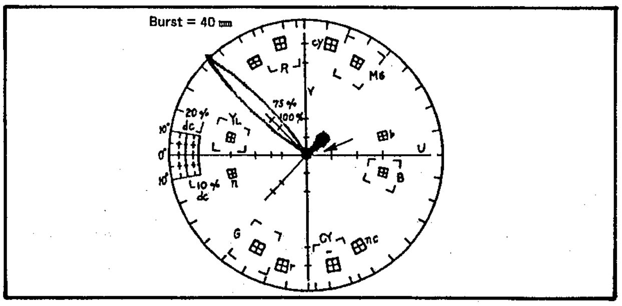

Burst = 40 mm
R
MG
YL
75%
100%
20%
dc
10°
0°
10°
10%
dc
Y
U
B
G
CY

Fig. II-59

5-12 R/B GAIN adjustment

* Note: For adjustment, turn a zoom stting from the standard angle of view to a wide angle, and set the angle of view shown in the Fig. II-58.

CHART	Color bar (5600°) Fig. II-58
MODE	TP2214 (PRESET) ↔ GND
M. EQ.	Vectorscope
ADJ.	PRO C.B.A. VR2209 (R GAIN)/ VR2210 (B GAIN)
SPEC.	Bright dot (white) to be centered.

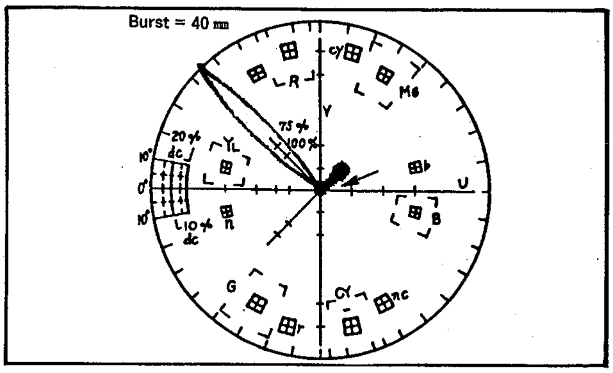

Burst = 40 mm
R
MG
YL
75%
100%
20%
dc
10°
0°
10°
10%
dc
Y
U
B
G
CY

Fig. II-60

5-13 Color balance adjustment

CHART	Color bar (5600°K)
MODE	TP2214 (PRESET) ↔ GND
M. EQ.	Vectorscope
ADJ.	PRO C.B.A. VR2205 (B-Y HUE) VR2206 (R-Y HUE) VR2207 (B-Y GAIN) VR2208 (R-Y GAIN)
SPEC.	Color phase Gain (against Burst) R 103 ± 2° 2.2 ± 0.1 times Ye 160 ± 2° 1.4 ± 0.1 times G 246 ± 8° 1.3 ± 0.3 times

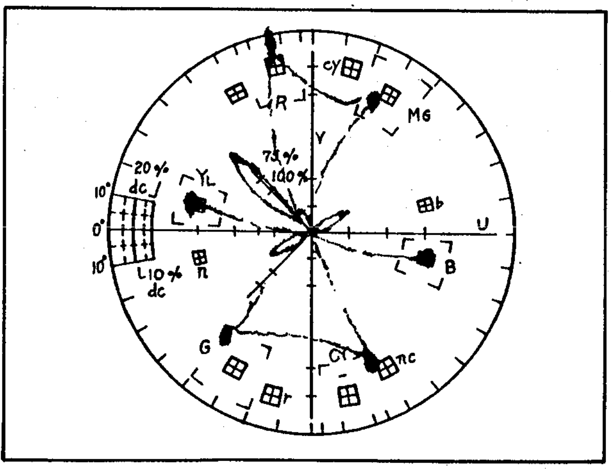

R
MG
YL
75%
100%
20%
dc
10°
0°
10°
10%
dc
Y
U
B
G
CY

Fig. II-61

5-14 FAWB/AF (Focus motor speed, ES threshold level) adjustment

1) FAWB adjustment (Refer to the steps from 1 through 4 in p. II-25).

* Notes:
1. From the step 1 through 4 are for the FAWB adjustment, and 5 for the AF adjustment.
2. Set TP2214 to OPEN state.
3. Be sure to perform the adjustment in a dark room to protect the AWB sensor from external light.
4. Attach the filter at the front of lens with the fixture.
5. Attach two pieces of CCB8 however the indication on screen appears "CCB20" at STEP 4.

CHART	White chart (3200°K halogen lighted)
MODE	FAWB/AF adjustment mode (p. II-11)
M. EQ.	Vectorscope
TOOL	Halogen lamp 3200°K CCB12 filter (DY9-2042-000) CCB8 filter (DY9-2043-000) Fixture (Supplementary provided for A1)
TP/TRIG.	PRO C.B.A. TP2228 (ADJ.)
ADJ.	Keys

Procedures:

(1) Set up the equipments as shown i the Fig. II-62.

(2) Connect TP2228 to ground. Then, set the camera to FAWB adjustment mode. (p. II-11)

(3) Perform either automatic or manual adjustment.
   1) Automatic adjustment ... (5-14-1)
   2) Manual adjustment ...... (5-14-2)

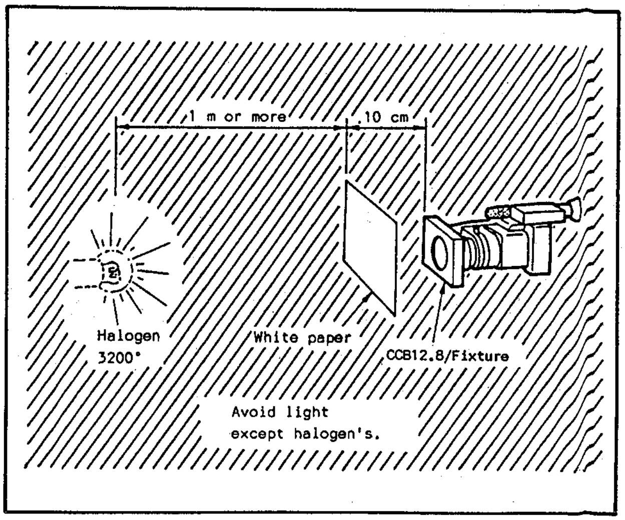


Fig. II-62

2) AF (ES threshold level/Focus motor speed) adjustment [STEP 5]

CHART	Gray/White chart (5600°K)
MODE	FAWB/AF (p. II-11)
M. EQ.	Monitor TV
TP/TRIG	PRO C.B.A. TP2228 (ADJ)
ADJ.	Keys

Procedures:

(1) Connect the TP2228 to ground. Theh, set the STEP 5 with + / - buttons.

(2) Shoot the Gray/White chart with a standard angle of view. Then, set the focusing to the best position.

* Note: When the One Shot Switch is pushed at this step, the adjustment is made automatically. (The AF is automatically adjusted irrelevant to the mode.)

5-14-1 FAWB/AF adjustment mode 1 (FAWB auto)

(1) Confirm each step on the display. At "COMPLETE" state, the bright dots are to be located on the center of vectorscope.

(2) If any mistake is made during each step, retry from the beginning of relevant step. For this purpose, terminate the relevant step prematurely and go back to its beginning.

Table II-1 (1/2)

STEPS		PROCEDURES	DISPLAY
STEP 1	1-0	1. Ground TP2228 (ADJ).	STEP 1 LENS CAP START?
	1-1	1. Shoot the white chart for 6 sec. or more. Then, push the EXP. switch for AE lock. 2. Check that "1" indication flashing on the LED lights up. 3. Cap the lens.	STEP 1 LENS CAP
	1-2	1. Push the PUSH AF switch. ↓	WORKING ...
		After 1 sec. (approx.), the indication at right column appears.	OK WRITE?
	1-3	1. Push the PUSH AF switch. After 0.5 sec. (approx.), the indication at right column appears. * Note: When the bright dots can not be located on the center of vectorscope, perform the carrier balance adjustment (5-10).	COMPLETE
Defective unit	1-2'	° If the indication at right column appears after the step 1-2, the FAWB control signal loop may be faulty.	WORKING ...
		° If the indication at right column appears after the step 1-2, the AWB sensor may be defective or the filter may be wrong.	N.G. TRY AGAIN?

Tale II-1 (2/2)

STEPS		PROCEDURES	DISPLAY
	1-3'	° If the indication at right column appears after the step 1-3, repeat the procedures from 1-1. If it still appears, IC2209 (E^2PROM) may be defective.	WORKING ...
STEP 2	2-1	1. Push the CONTROL ⊕ switch to set the STEP 2 condition. 2. Shoot the white chart (3200°K) for 6 sec. or more.	STEP 2 3200K START?
	2-2,3 2-2',3'	Same as 1-2 through 1-3, 1-2' through 1-3' of the step 1.	(Same as STEP 1)
STEP 3	3-1	1. Push the CONTROL ⊕ switch to set the STEP 3 condition. 2. Shoot the white chart (3200°K, CCB12) for 6 sec. or more.	STEP 3 3200K+CCB12 START?
	3-2,3 3-2',3'	Same as 1-2 through 1-3, 1-2' through 1-3' of the step 1.	(Same as STEP 1)
STEP 4	4-1	1. Push the CONTROL ⊕ switch to set the STEP 4 condition. 2. Shoot the white chart (3200°K, CCB8 x 2) for 6 sec. or more.	STEP 4 3200K+CCB20 START?
	4-2,3 4-2',3'	Same as 1-2 through 1-3, 1-2' through 1-3' of the STEP 1.	(Same as STEP 1)
STEP 5	5-1	1. Push the CONTROL + switch to set the STEP 5 condition. 2. Shoot the Gray/White chart with a standard angle of view (5600°K) 3. Adjust the focusing to the best position.	STEP 5 AF ADJUSTMENT START?
	5-2	1. Push the PUSH AF switch to move the focus motor back and forth. (Then, the right indication appears after 10 sec.)	WORKING COMPLETE
Defective unit	5-2'	1. If the right indication appears before the focus motor moves, check the focusing, ES signal operation, etc. 2. If the right indication appears after the focus motor moves, check the focus motor operation.	N.G. TRY AGAIN

5-14-2 FAWB/AF adjustment mode 2 (FAWB manual)

(1) Confirm each step on the display. At "COMPLETE" state, the bright dots are to be located on the position they should be.

(2) If any mistake is made during each step, retry from the beginning of relevant step. For this purpose, terminate the relevant step prematurely and go back to its beginning.

Table II-2 (1/2)

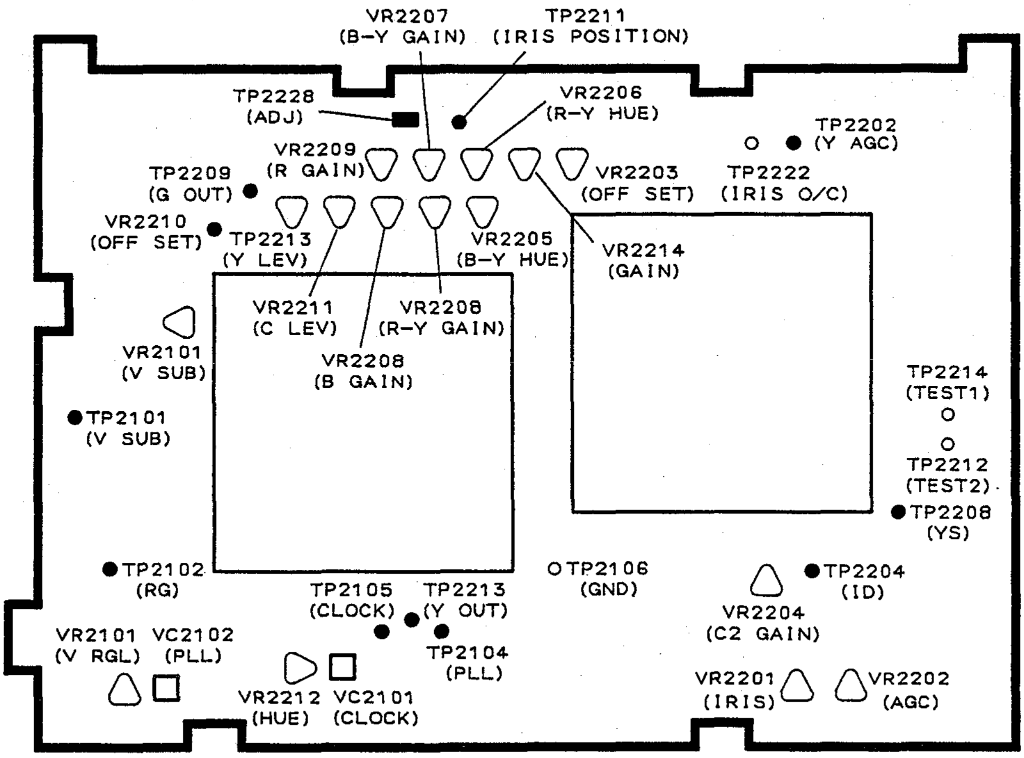
STEPS		PROCEDURES	DISPLAY
STEP 1	1-0	1. Remove R2365. Then, connect pin 34 of IC2205 to +5 V. 2. Connect TP2228 (ADJ) to ground.	STEP 1 LENS CAP START?
	1-1	1. Shoot the white chart for 6 sec. or more. Then, push the EXP. switch for AE lock. 2. Check that "1" indication flashing on the LED lights up. 3. Cap the lens.	STEP 1 LENS CAP
	1-2	1. Push the PUSH AF switch. ↓ After 1 sec. (approx.) the indication at right column appears.	WORKING ... OK WRITE?
	1-3	1. Push the PUSH AF switch. After 0.5 sec. (approx.), the indication at right column appears. * Note: When the bright dots cannot be located on the center of vectorscope, perform the carrier balance adjustment (5-10).	COMPLETE
Defective unit	1-2'	° If the indication at right column appears after the step 1-2, the FAWB control signal loop may be faulty.	WORKING ...
		° If the indication at right column appears after the step 1-2, the AWB sensor may be defective or the filter may be wrong.	N.G. TRY AGAIN?
	1-3'	° If the indication at right column appears after the step 1-3, repeat the procedures from 1-1. If it still appears, IC2209 (E^2PROM) may be defective.	WORKING ...
STEP 2	2-1	1. Push the CONTROL ⊕ switch to set the STEP 2 condition. 2. Shoot the white chart (3200°K) for 6 sec. or more.	STEP 2 3200K START?
	2-2	1. Push the PUSH AF switch. After 1 sec. approximately, the indication at right column appears. 2. Adjust bright dot position with the switches of REC SEARCH ⊕⊖ (R-Y) and TITLE/DATE (B-Y).	WORKING ... OK WRITE?

Table II-2 (2/2)

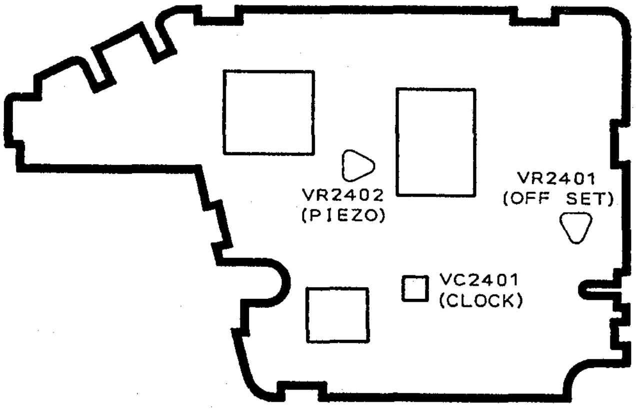
STEPS		PROCEDURES	DISPLAY
	2-3	1. Push the PUSH AF switch. After 0.5 sec. approximately, the indication at right column appears.	———— COMPLETE
	2-2',3'	Same as 1-2' through 1-3' of the step 1.	———— (Same as STEP 1)
STEP 3	3-1	1. Push the CONTROL ⊕ switch to set the STEP 3 condition. 2. Shoot the white chart (3200°K, CCB12) for 6 sec. or more.	STEP 3 3200K+CCB12 START?
	3-2,3 3-2',3'	Same as 2-2 through 2-3, 2-2' through 2-3' of the STEP 2.	———— (Same as STEP 2)
STEP 4	4-1	1. Push the CONTROL ⊕ switch to set the step 4 condition. 2. Shoot the white chart (3200°K, CCB8 x 2) for 6 sec. or more.	STEP 4 3200K+CCB20 START?
	4-2,3 4-2',3'	Same as 2-2 through 2-3, 2-2' through 2-3' of the step 2.	———— (Same as STEP 2)
STEP 5	5-1	1. Push the CONTROL ⊕ switch to set the step 5 condition. 2. Shoot the Gray/White chart (5600°K) with a standard angle of view. 3. Adjust the focusing to the best position.	STEP 5 AF ADJUSTMENT START?
	5-2	1. Push the Push AF switch to move the focus motor back and forth. (Then, the right indication appears after 10 sec.)	———— WORKING ———— COMPLETE
Defective unit	5-2'	1. If the right indication appears before the focus motor moves, check the focusing, chart, ES signal operation, etc. 2. If the right indication appears after the focus motor moves, check the focus motor operation.	———— N.G. TRY AGAIN

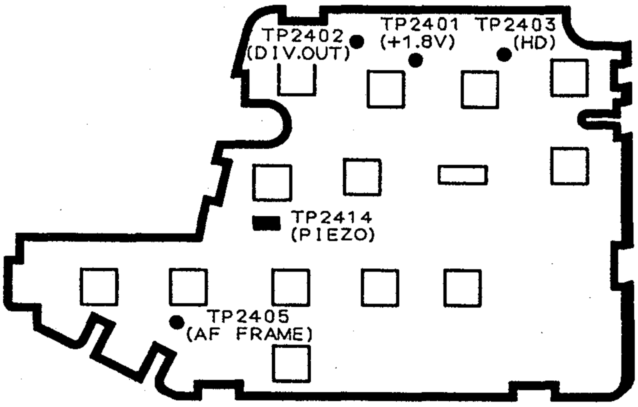
Locations of TPs/VRs/VCs

PROCESS C.B.A.


VR2207
(B-Y GAIN)
TP2211
(IRIS POSITION)
TP2228
(ADJ)
VR2206
(R-Y HUE)
TP2202
(Y AGC)
VR2209
(R GAIN)
TP2209
(G OUT)
VR2203
(OFF SET)
TP2222
(IRIS O/C)
VR2210
(OFF SET)
TP2213
(Y LEV)
VR2205
(B-Y HUE)
VR2214
(GAIN)
VR2211
(C LEV)
VR2208
(R-Y GAIN)
VR2101
(V SUB)
VR2208
(B GAIN)
TP2214
(TEST1)
TP2101
(V SUB)
TP2212
(TEST2)
TP2208
(YS)
TP2102
(RG)
TP2105
(CLOCK)
TP2213
(Y OUT)
TP2106
(GND)
TP2204
(ID)
VR2204
(C2 GAIN)
VR2101
(V RGL)
VC2102
(PLL)
TP2104
(PLL)
VR2212
(HUE)
VC2101
(CLOCK)
VR2201
(IRIS)
VR2202
(AGC)

AF-KEY C.B.A.


VR2402
(PIEZO)
VR2401
(OFF SET)
VC2401
(CLOCK)


TP2402
(DIV.OUT)
TP2401
(+1.8V)
TP2403
(HD)
TP2414
(PIEZO)
TP2405
(AF FRAME)

6. Electrical Adjustments (Recorder/EVF Section)

* Notes:
1. Set the switch of Y/C separator to the Y side.
2. Turn on the burst switch of pattern generator.

6-1 SS5V adjustment

MODE	EE
M. EQ.	Digital voltmeter
TP/TRIG.	SYSCON-SERVO C.B.A. IC1602 Pin 8
ADJ.	SYSCON-SERVO C.B.A. VR1601 (SS 5V)
SPEC.	5.0 ± 0.02 V

6-2 Undercut adjustment

* Note: Perform the adjustment with the GRIP C.B.A. and the camera unit connected.

MODE	REC (SERVICE MODE STEP 3)
M. EQ.	Digital voltmeter, Monitor TV
ADJ.	SYSCON-SERVO C.B.A. VR102 (BATT)
SPEC.	BATT = 80 ± 01 H/5.53 ± 0.1 V

Procedures:
(1) Set the STEP 3.
(2) Set the power source voltage at 5.53 ± 0.1 V.
(3) Adjust VR so that the specified value appears on the monitor.

6-3 Switching point adjustment

SIGNAL	MONOSCOPE master (DY9-1062-000)
MODE	PB
M. EQ.	Oscilloscope
TP/TRIG.	VIDEO SUB C.B.A. CN1703 pin 3 (HSW) VIDEO OUT
ADJ.	SYSCON-SERVO C.B.A. VR101 (PG DL)
SPEC.	7.0 ± 0.5 H

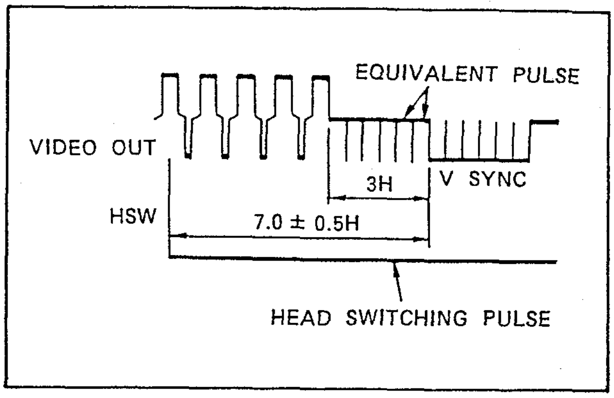


Fig. II-63

6-4 DSP Y OUT level adjustment

SIGNAL	White chart
MODE	CAMERA EE
M. EQ.	Oscilloscope
TP/TRIG.	VIDEO C.B.A. IC208 pin 1 (CAM Y) pin 3 (DSP Y)
ADJ.	SYSCON-SERVO C.B.A. VR1503 (DSP Y)
SPEC.	pin 1 = pin 3

Procedures:
(1) Set the setting 4 (5) condition.
(2) Shoot the white chart.
(3) Adjust VR so that the specified value.

6-5 DSP C OUT level adjustment

SIGNAL	Color bar chart
MODE	CAMERA EE
M. EQ.	Oscilloscope
TP/TRIG.	VIDEO OUT
ADJ.	SYSCON-SERVO C.B.A. VR1504 (DSP C LEVEL)
SPEC.	Maximize chrominance component

Procedures:
(1) Set the setting 4 (5) condition.
(2) Shoot the color bar chart.
(3) Adjust VR so that the specified value.

6-6 VCO adjustment

SIGNAL	White chart
MODE	CAMERA EE (Closeup mode)
M. EQ.	Oscilloscope
TP/TRIG.	VIDEO OUT
ADJ.	SYSCON-SERVO VR302 (DSP VCO)
SPEC.	t = 0.6 ± 0.1 s

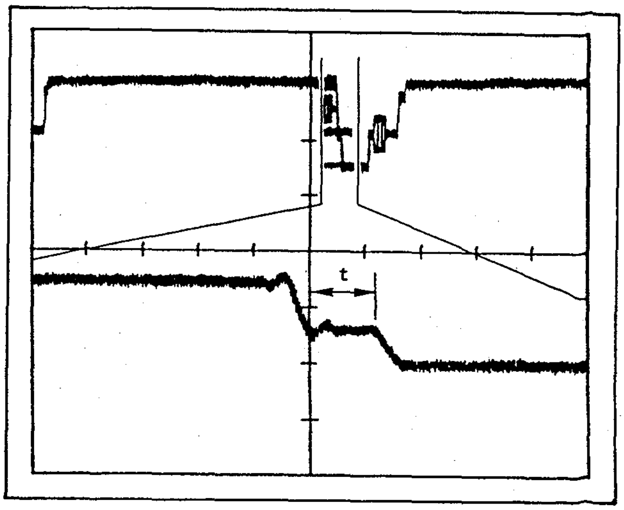
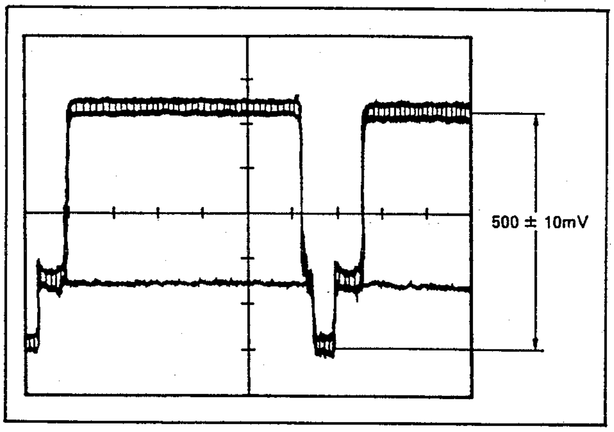


Fig. II-64

0.5 μs 0.1 V

6-7 VIDEO AGC adjustment

SIGNAL	100% white video signal
MODE	EE
M. EQ.	Oscilloscope
TP/TRIG.	VIDEO C.B.A. TP214 (Y 1)
ADJ.	VIDEO C.B.A. VR203 (Y AGC)
SPEC.	500 ± 10 mV



6-8 Comb filter adjustment

SIGNAL	Self-record/playback tape (HiME), color bar signal
MODE	PB
M. EQ.	Oscilloscope
TP/TRIG.	VIDEO C.B.A. TP203 (COMB C)
ADJ.	VIDEO C.B.A. VR210 (2HDL PHASE) VR202 (2HDL LEV.)
SPEC.	Minimize chrominance component

Procedure:

(1) To minimize the chrominance component at the TP206, adjust VRs 210 and 202 alternately.

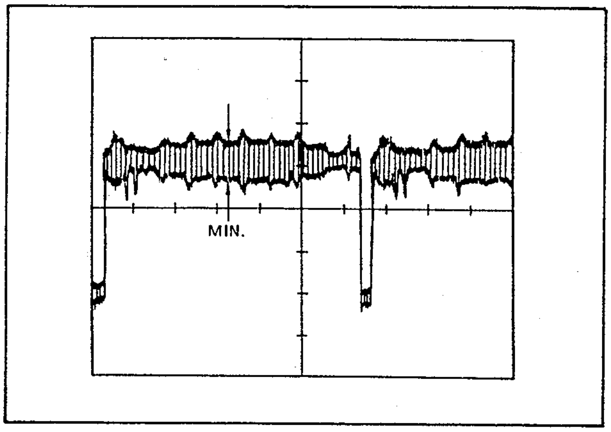


Fig. II-66 5 mV/10 µs

6-9 Video level adjustment

SIGNAL	100% white video signal
MODE	EE
M. EQ.	Oscilloscope
TP/TRIG.	VIDEO C.B.A. TP206 (Y2)
ADJ.	VIDEO C.B.A. VR309 (REC Y LEV.)
SPEC.	500 ± 10 mV

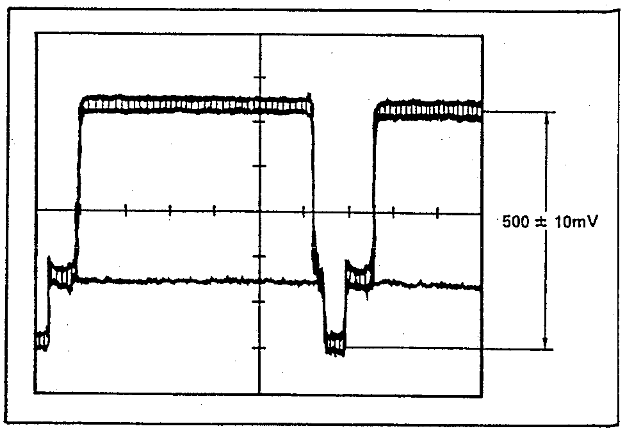


Fig. II-67

6-10 Chrominance emphasis adjustment

SIGNAL	Color bar signal
MODE	EE
M. EQ.	Oscilloscope
TP/TRIG.	VIDEO C.B.A. 208 (C ENPHA)
ADJ.	VIDEO C.B.A. VL301 (C ENPHA)
SPEC.	Minimize yellow portion at its right end

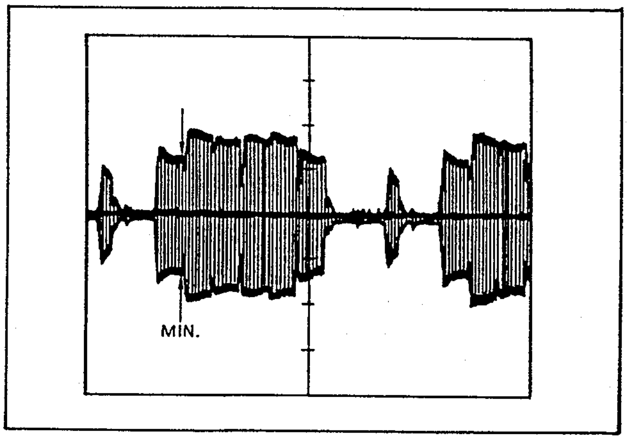


Fig. II-68 10 mV/10 µs

6-11 Y FM carrier (normal) adjustment

* Note: Use a normal tape.

SIGNAL	No signal (Termifnal-opened)
MODE	EE/NORMAL
M. EQ.	Oscilloscope, Frequency counter
TP/TRIG.	VIDEO C.B.A. CN206 pin 8 (REC RF)
ADJ.	VIDEO C.B.A. VR206 (N CAR)
SPEC.	4.38 ± 0.02 MHz

6-12 Y FM deviation (normal) adjustment

* Notes:
1. Use a normal tape.
2. Observe the signal waveform having the shortest cycle.
3. After this adjustment, perform the 6-11 and 6-12 adjustments. Then, perform this adjustment again to check if the specified value is kept.

SIGNAL	100% white video signal
MODE	EE/NORMAL
M. EQ.	Oscilloscope
TP/TRIG.	VIDEO C.B.A. CN206 pin 8 (REC RF)
ADJ.	VIDEO C.B.A. VR208 (N DEV)
SPEC.	0.19 µs/1 cycle Graduation 3.8 at 50 ns Div.

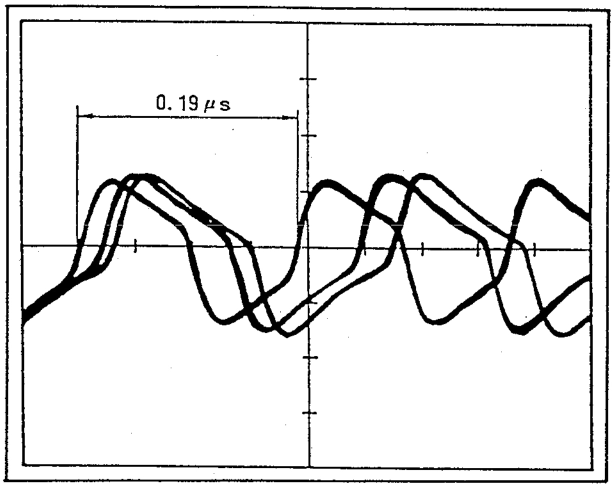


Fig. II-69 5 mV/50 ns

6-13 Y FM carrier (Hi8) adjustment

* Note: Use a Hi8 tape.

SIGNAL	No signal (Terminal-opened)
MODE	EE/Hi8
M. EQ.	Oscilloscope, Frequency counter
TP/TRIG.	VIDEO C.B.A. CN206 pin 8 (REC RF)
ADJ.	VIDEO C.B.A. VR204 (Hi8 CAR)
SPEC.	5.99 ± 0.02 MHz

6-14 Y FM deviation (Hi8) adjustment

* Notes:
1. Use a normal tape.
2. Observe the signal waveform having the shortest cycle.
3. After this adjustment, perform the 6-13 and 6-14 adjustments. Then, perform this adjustment again to check if the specified value is kept.

SIGNAL	100% white video signal
MODE	REC/Hi8
M. EQ.	Oscilloscope
TP/TRIG.	VIDEO C.B.A. CN206 pin 8 (REC RF)
ADJ.	VIDEO C.B.A. VR207 (Hi8 DEV.)
SPEC.	0.3975 µs/3 cycles Graduation 7.95 at 50 ns

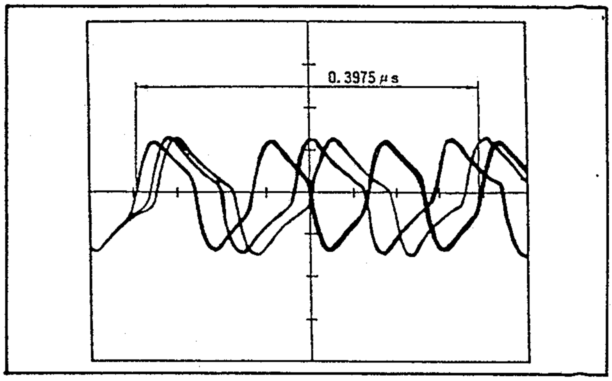


Fig. II-70 5 mV/50 ns

6-15 PB Y level adjustment (1)

SIGNAL	Self-record/playback tape (HiME), 100% white video signal
MODE	PB
M. EQ.	Oscilloscope
TP/TRIG.	VIDEO C.B.A. TP202 (YO)
ADJ.	VIDEO C.B.A. VR306 (PB Y LEVE.1)
SPEC.	500 ± 10 mV

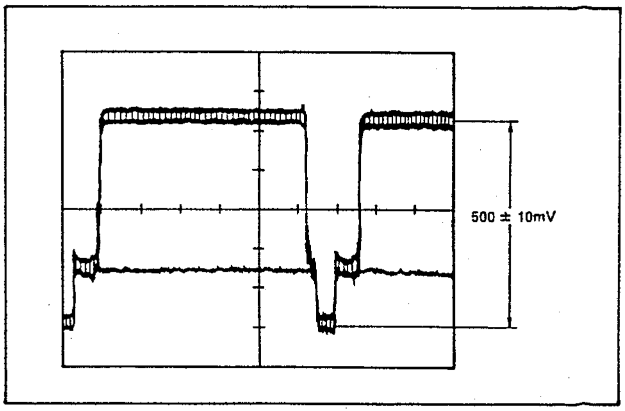


Fig. II-71 10 mV/10 ns

6-16 PB Y level adjustment (2)

SIGNAL	Self-record/playback tape (HiME), 100% white video signal
MODE	PB (S terminal-opened)
M. EQ.	Oscilloscope
TP/TRIG.	VIDEO C.B.A. CN201 pin 1
ADJ.	VIDEO C.B.A. VR308 (PB Y LEV.2)
SPEC.	2.0 ± 0.04 V

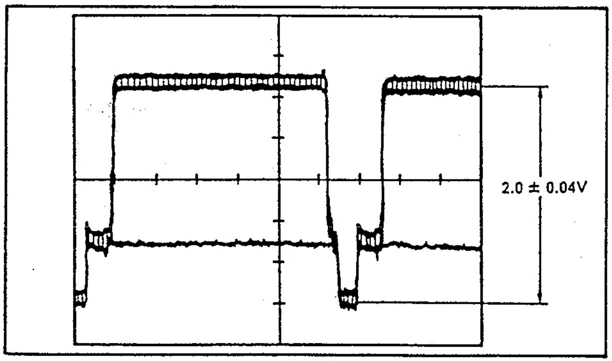


Fig. II-72 0.5 V/10 µs

6-17 Character position of character adjustment

* Note: Display characters by a wireless remote controller with an EVF connected.

SIGNAL	Color bar
MODE	EE
M. EQ.	Monitor TV
TP/TRIG.	VIDEO C.B.A. VC201 (CG SIZE)
SPEC.	Lowermost digit of counter located between blue and black color bars

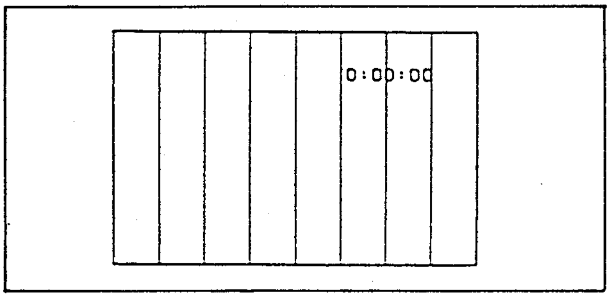


Fig. II-73

6-18 JOG chrominance phase adjustment

SIGNAL	Red signal (pattern generator)
MODE	Search
M. EQ.	Monitor
ADJ.	VR310 (JOG BURST)
SPEC.	Eliminate the block stripes

Proceudres:

(1) Record red signal in LP mode.

(2) Playback and search the recorded part.

(3) Eliminate the black stripes on the screen.

6-19 Peaking adjustment

* Note: Perform this adjustment only after replacing an upper drum assembly, drum assembly, or a HEAD AMP C.B.A.

SIGNAL	V sweep master (Hi8) (DY9-1111-500)
MODE	PB (SERVICE MODE STEP 4)
M. EQ.	Oscilloscope
TP/TRIG.	VIDEO SUB C.B.A. CN1703-Pin 1 (PB/RF) Pin 3 (HSW)
ADJ.	HEAD AMP C.B.A. VR102 (CH-1), VR101 (CH-2), VR151 (CH-1')
SPEC.	4.5 MHz : 8.5 MHz = 3:2

Procedures:

(1) Set the setting 3 condition.

(2) Playback the V sweep master (Hi8).

(3) Observing the waveform, trigger the PB RF signal with the HSW.

(4) Observing the waveform of CH-1 (HSW, High period), adjust it by VR102 as specified.

(5) Observing the waveform of CH-2 (HSW, Low period), adjust it by VR101 as specified.

(6) Stop the tape, and set the step 4 of service mode.

(7) Push the R. MODE SW to set the LP mode.

(8) Perform the procedures (2) and (3).

(9) Observing the waveform of CH-1' (HSW, LOW period), and adjust it by VR151 as specified.

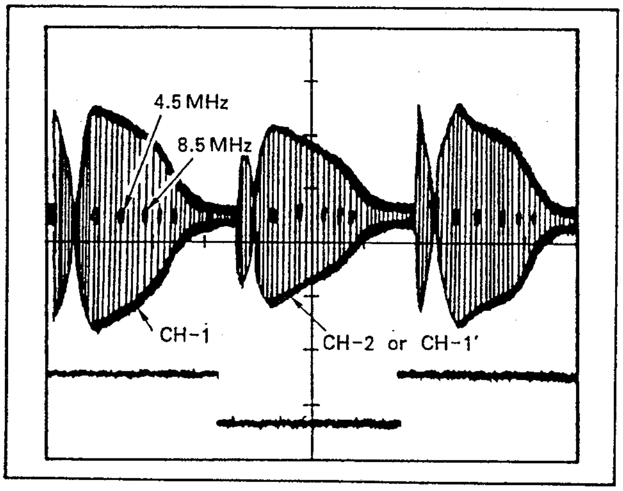


Fig. II-74

6-20 Recording current adjustment

(1) Luminance signal

SIGNAL	No signal (Terminal-opened)
MODE	REC/Hi8 ME tape
M. EQ.	Oscilloscope
TP/TRIG.	HEAD AMP C.B.A. TP101 (REC CURR)
ADJ.	VIDEO C.B.A. VR305 (REC Y)
SPEC.	200 ± 10 mVp-p

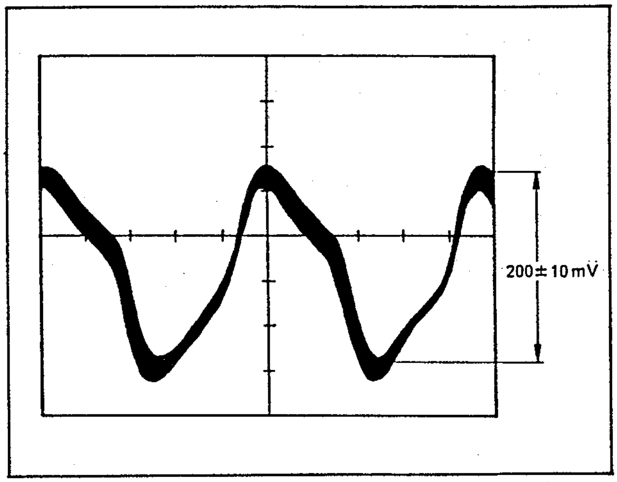


Fig. II-75 5 mV/50 ns

(2) Chrominance, Audio, ATF signals

MODE	REC/Hi8 ME tape
M. EQ.	Oscilloscope
TP/TRIG.	HEAD AMP C.B.A. TP101 (REC CURR)
TOOL	Recording current checker (DY9-1056-000)

* Note: Connect the TP101 with the recording current checker with a probe (1:1).

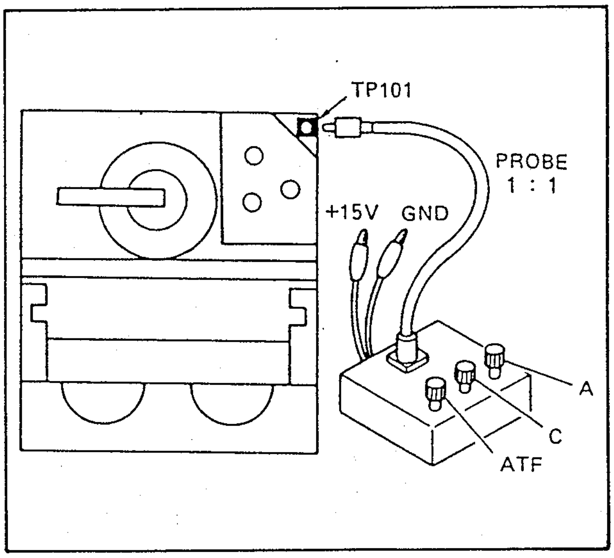


Fig. II-76

° Chrominance

SIGNAL	Red raster signal
ADJ.	VIDEO C.B.A. VR304 (REC C)
SPEC.	1.4 ± 0.1 Vp-p

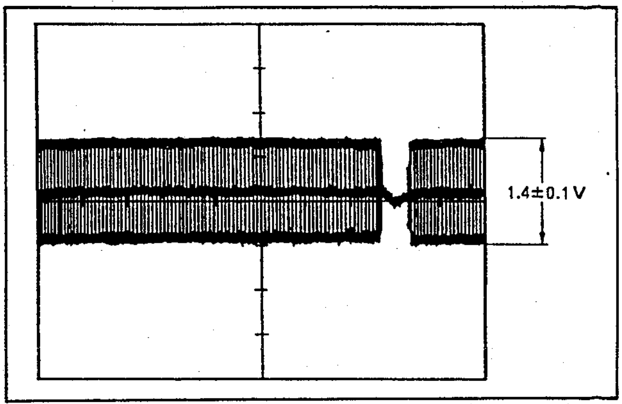


Fig. II-77 50 mV/2 ms

° Audio

* Note: Connect the AUDIO C.B.A.

SIGNAL	100% white video signal
ADJ.	VIDEO C.B.A. VR302 (REC AFM)
SPEC.	1.5 ± 0.1 Vp-p

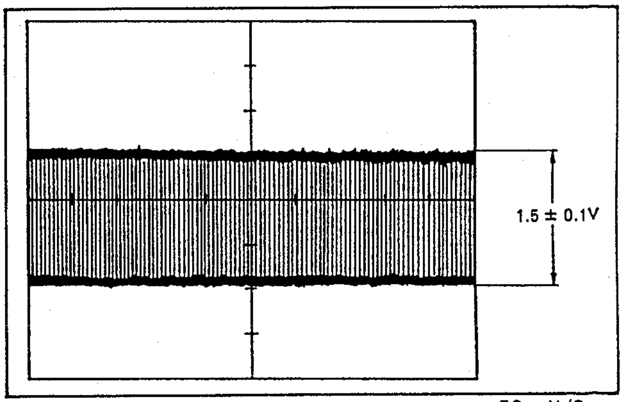


Fig. II-78 50 mV/2 ms

° ATF

SIGNAL	100% white video signal
ADJ.	VIDEO C.B.A. VR303 (REC ATF)
SPEC.	DC 0.6 ± 0.1 V

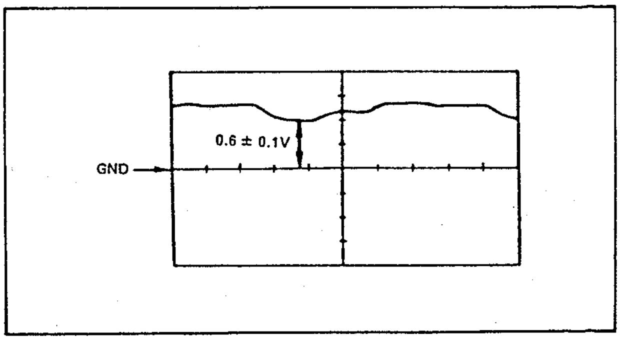
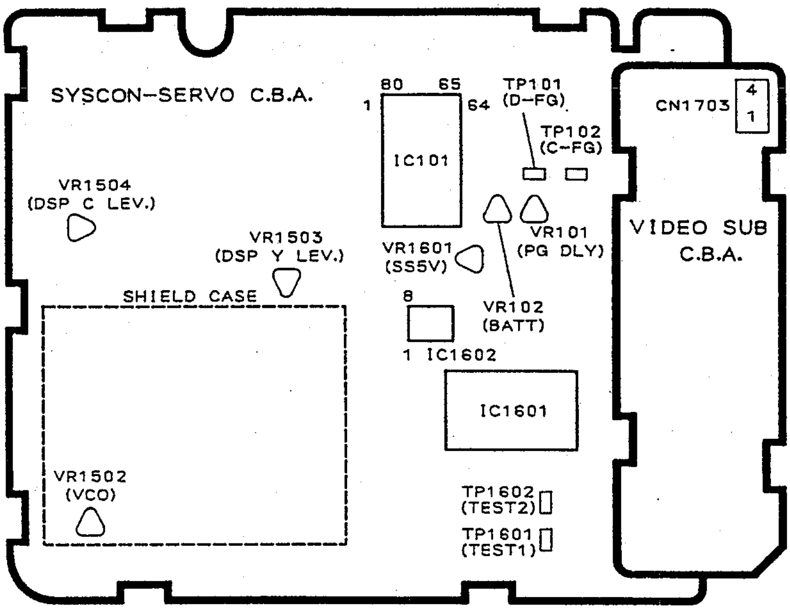


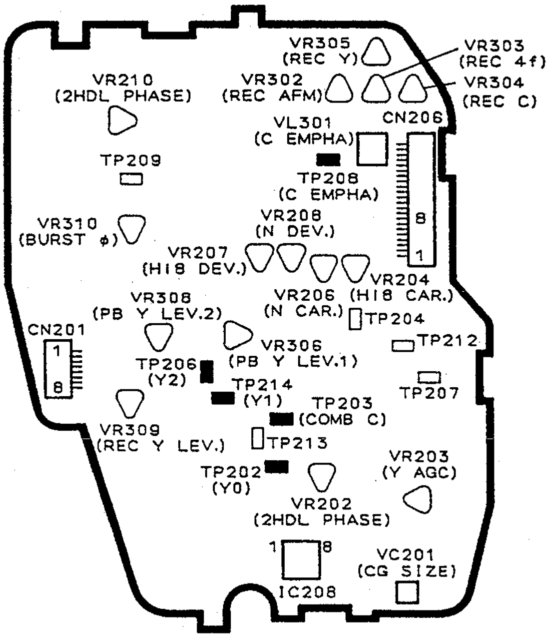
Fig. II-79 50 mV/10 ms

Locations of TPs/VRs/VCs

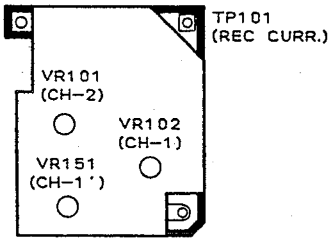
SYSCON–SERVO, VIDEO SUB C.B.A.


SYSCON–SERVO C.B.A.
80
65
1
64
IC101
TP101
(D–FG)
TP102
(C–FG)
CN1703
4
1
VR1504
(DSP C LEV.)
VR1503
(DSP Y LEV.)
VR1601
(SS5V)
VR101
(PG DLY)
VR102
(BATT)
VIDEO SUB
C.B.A.
SHIELD CASE
8
1
IC1602
IC1601
VR1502
(VCO)
TP1602
(TEST2)
TP1601
(TEST1)

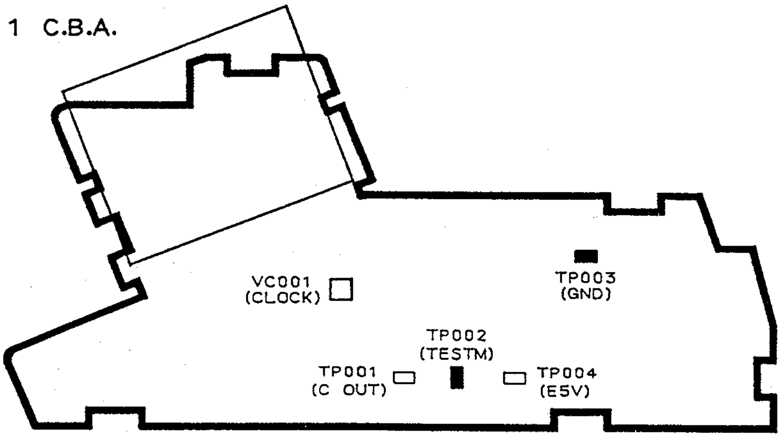
VIDEO C.B.A.


VR305
(REC Y)
VR303
(REC 4f)
VR210
(2HDL PHASE)
VR302
(REC AFM)
VR304
(REC C)
VL301
(C EMPHA)
CN206
TP209
TP208
(C EMPHA)
VR208
(N DEV.)
8
1
VR310
(BURST ϕ)
VR207
(HI8 DEV.)
VR204
VR206 (HI8 CAR.)
(N CAR.)
TP204
VR308
(PB Y LEV.2)
CN201
1
8
VR306
(PB Y LEV.1)
TP212
TP206
(Y2)
TP214
(Y1)
TP207
TP203
(COMB C)
VR309
(REC Y LEV.)
TP213
TP202
(Y0)
VR203
(Y AGC)
VR202
(2HDL PHASE)
1
8
IC208
VC201
(CG SIZE)

HEAD AMP C.B.A.


TP101
(REC CURR.)
VR101
(CH–2)
VR102
(CH–1)
VR151
(CH–1')

RECORDER–KEY 1 C.B.A.


VC001
(CLOCK)
TP003
(GND)
TP002
(TESTM)
TP001
(C OUT)
TP004
(E5V)

7. EVF Adjustments

7-1 Free-run frequency adjustment

SIGNAL	No signal (Terminal-opened)
MODE	EE
M. EQ.	Oscilloscope, Frequency counter
TP/TRIG.	EVF C.B.A. CW2901 pin 6 (HD)
ADJ.	EVF C.B.A. VR2902 (H. PHASE)
SPEC.	15.90 ± 0.05 KHz

7-2 Vertical amplitude adjustment

SIGNAL	Circle (round) subject
MODE	EE
M. EQ.	EVF, Monitor TV
ADJ.	EVF C.B.A. VR2901 (V-SIZE)
SPEC.	Free from distortion Absence of incongruity in comparison with monitor TV screen.

Procedures:

(1) Shoot a circle figure subject fully in the screen.

(2) Adjust the VR2901 so that there is no incongruity in comparison with the monitor TV screen.

7-3 Rotation and centering adjustment

MODE	EE
M. EQ.	EVF
ADJ.	Deflection yoke, Centering magnet
SPEC.	Screen is not tilted and is located right at the center.

Procedures:

(1) Choose a subject for judgement of centering and tilting. Then shoot it.

(2) Loosen the fastening ring to turn the deflection yoke.

(3) Turn the deflection yoke to correct the tilting of subject.

* Note: Move the deflection yoke completely toward the CRT screen.

(4) Tighten the fastening ring.

* Note: The fastening ring must be tightened so that the centering magnet can still be moved.

(5) Adjust the centering magnet so as to locate the subject image at the center.

(6) Tighten the fastening ring completely.

(7) Fix the centering magnet by applying paint or the like (at 180° interval, 2 points).

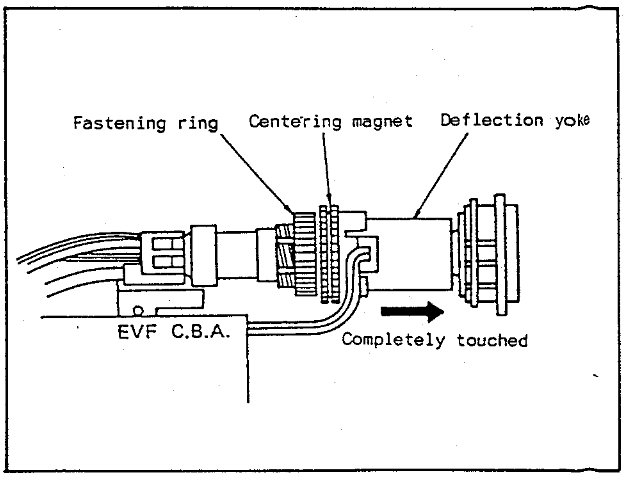


Fig. II-80

7-4 Brightness adjustment

SIGNAL	Self-record/playback tape (grayscale)
MODE	PLAY
M. EQ.	EVF
ADJ.	EVF C.B.A. VR2904 (BRIGHT)
SPEC.	Distinguishable down to 11th step grayscale

7-5 Focus adjustment

MODE	Lens-capped (character indication)
M. EQ.	EVF
ADJ.	EVF C.B.A. VR2903 (FOCUS)
SPEC.	EVF character under optimum focus

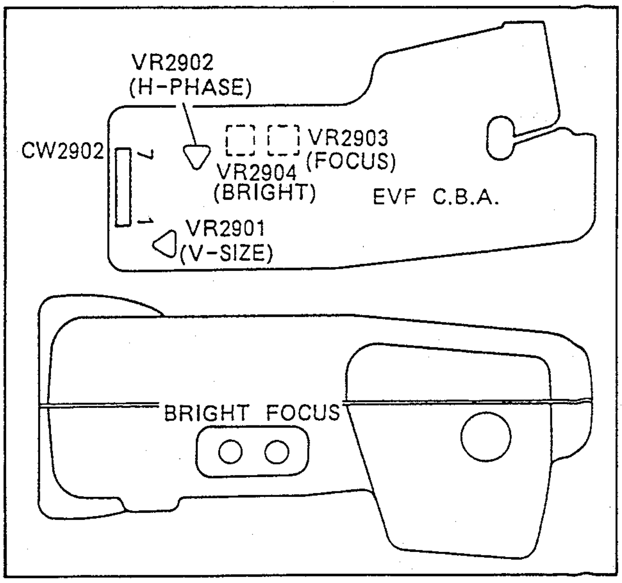


Fig. II-81

8. Mechanical Adjustment of Recorder Section

For mechanical adjustment of the recorder section, refer to the MC-4B Service Manual issued separately.

(The additional mechanical adjustment items for this model only are explained here.)

8-1 Mechanical adjustments

Additional item for fine tracking adjustment in 4-3.

Perform the steps from (1) through (4) as written on the manual.

Then, add the following step of adjustment (5) peculiar to the Hi8 type.

(5) Slightly turn the No. 6 guide clockwise so that B:C = 4:3.5. (See Fig. II-82.)

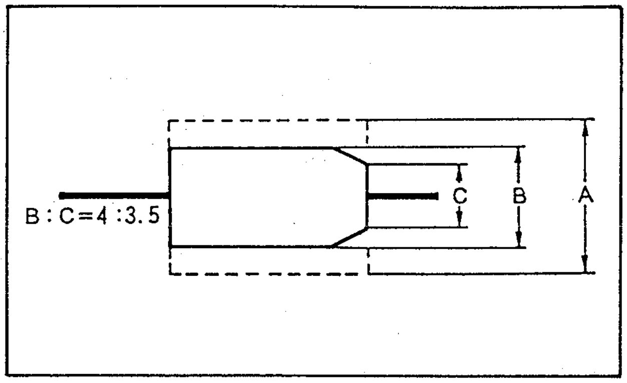


Fig. II-82

8-2 How to drive loading motor

To operate the loading motor independently, apply the power directly. (Fig. II-83)

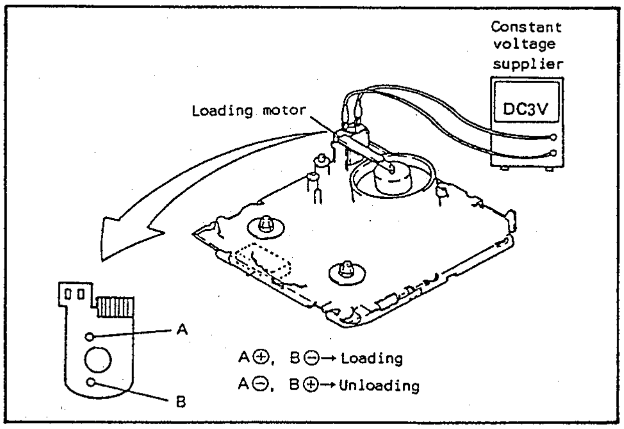


Fig. II-83

8-3 Replacement of upper drum

Refer to the Service Manual for MC-4B.
(Replacement of upper drum, 3-20)

* Parts ⓐ in the Fig. II-84 are plug-in type (Not soldered as in the conventional models)

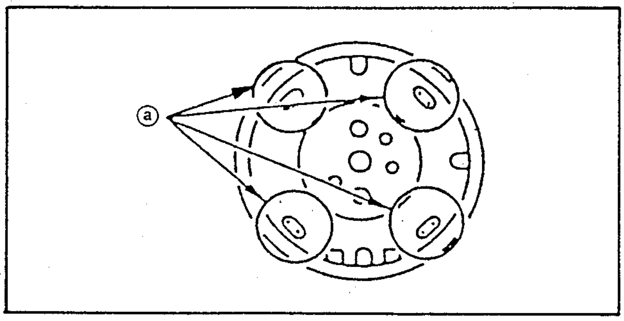


Fig. II-84

CONTENTS

EXPLODED VIEWS

- Casing Parts Section Ⅲ-1
- Lens / Camera Unit Section Ⅲ-3
- EVF / Recorder Unit Section Ⅲ-5
- Mechanical Chassis Section 1 .... Ⅲ-7
- Mechanical Chassis Section 2 .... Ⅲ-9
- Mechanical Chassis Section 3 .... Ⅲ-11
- Accessory Parts Section Ⅲ-13

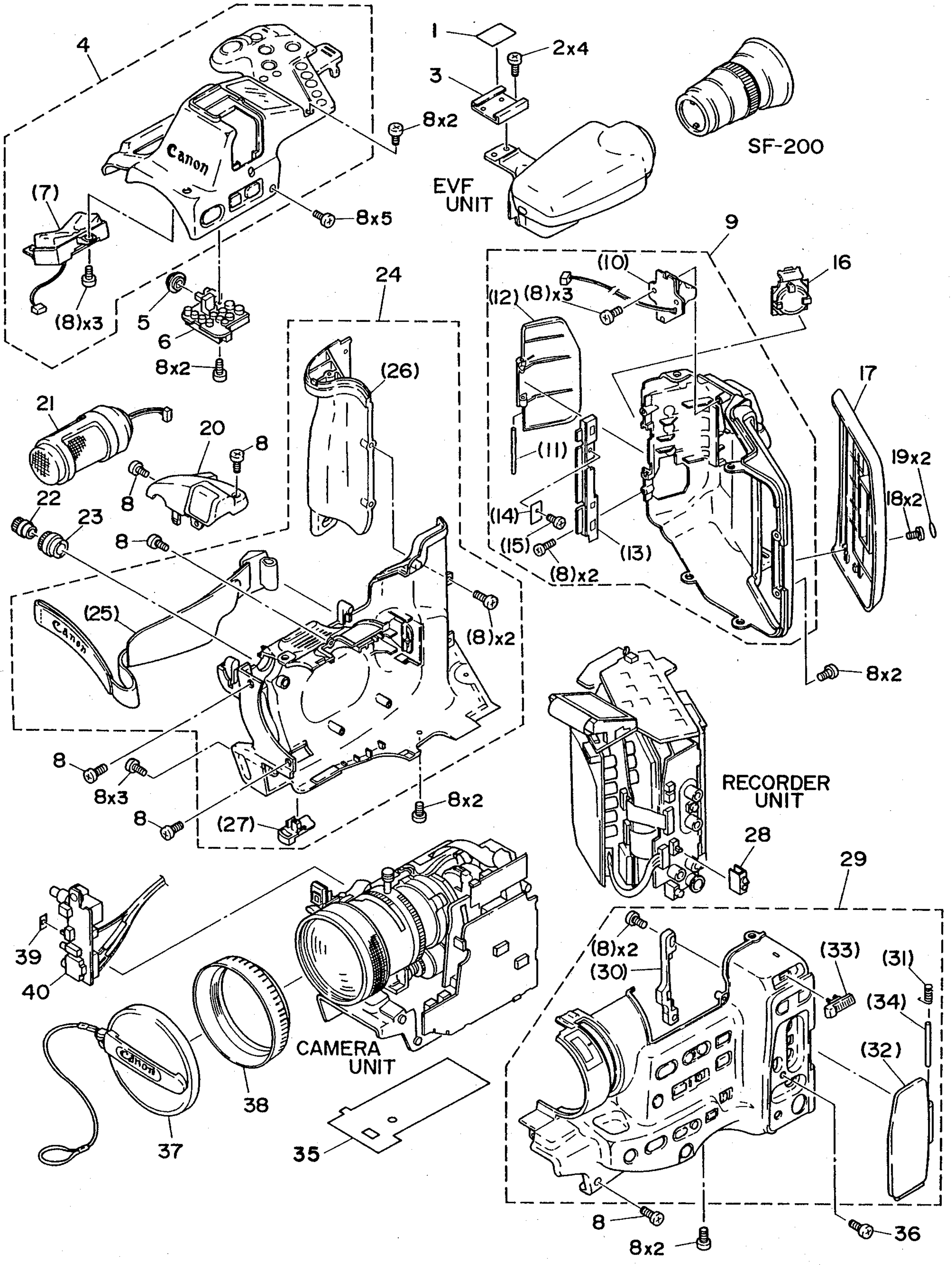
ELECTRICAL PARTS LIST Ⅲ-15

PARTS LIST Ⅲ-22

1. ESPECIALLY CRITICAL PARTS IN THE POWER CIRCUIT BLOCK SHOULD NOT BE REPLACED WITH OTHER MARKS.
   CRITICAL PARTS ARE MARKED WITH ⚠ IN THIS ELECTRICAL PARTS LIST.

2. THE NUMBERS INDICATED ON THE CONNECTORS DO NOT CORRESPOND TO THE SYMBOL NUMBERS.
   PLEASE CHECK THE CORRECT SYMBOL NUMBERS OF THE CONNECTORS ON THE INTERCONNECTION SCHEMATIC DIAGRAM.

Casing Parts Section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2x4
3
8x2
SF-200
EVF UNIT
(7)
8x5
9
(10)
16
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(8)x3
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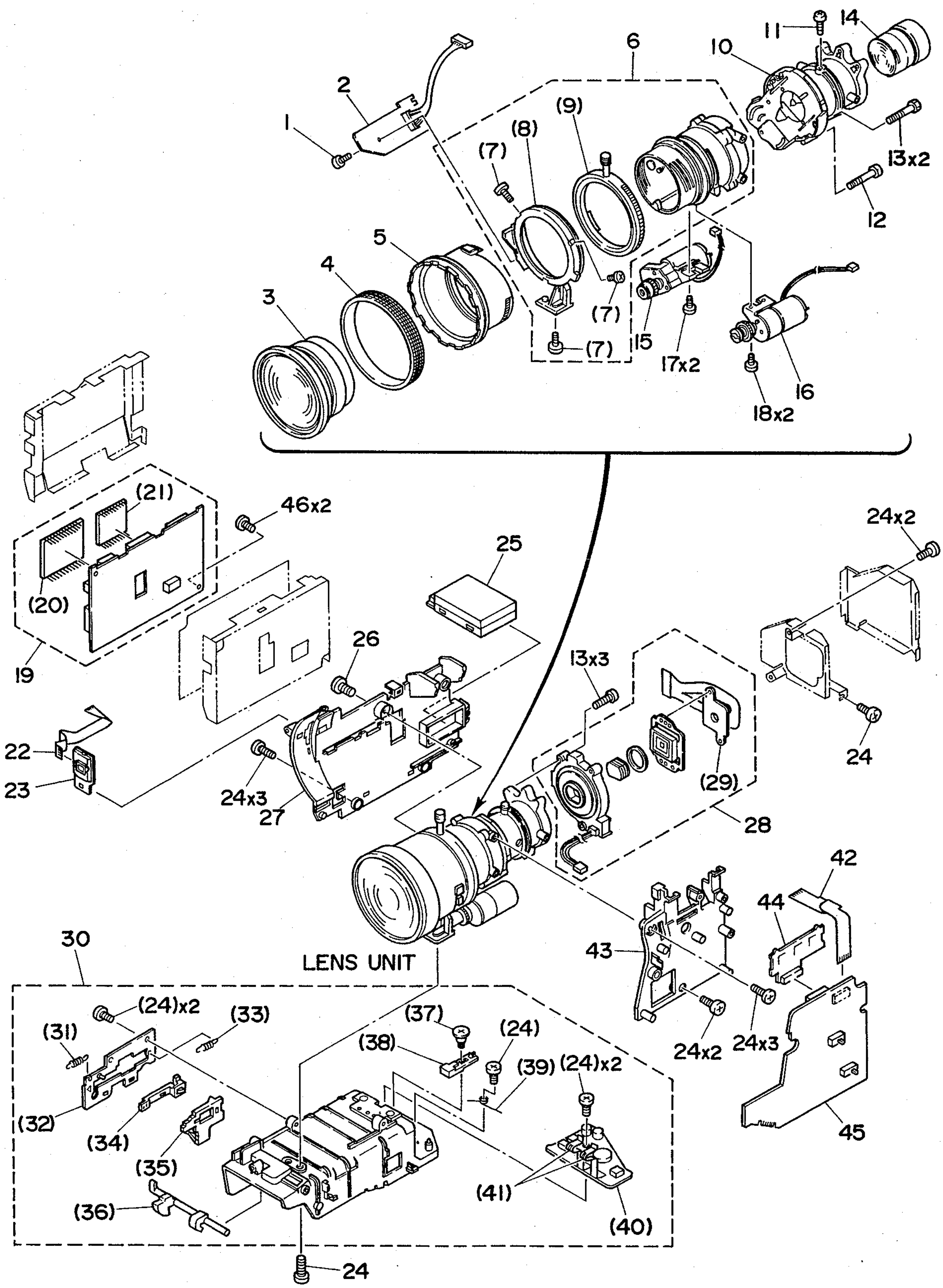
6
8x2
24
(26)
17
21
20
8
8
(11)
19x2
22
23
18x2
(14)
8
(15)
(13)
(8)x2
(25)
(8)x2
8x2
8
8x3
8
8x2
RECORDER UNIT
(27)
28
29
(8)x2
(30)
(33)
(31)
(34)
(32)
39
40
CAMERA UNIT
38
37
35
8
8x2
36

MECHANICAL PARTS

SYMBOL	PART NO.	CLASS	QTY	DESCRIPTION	REMARKS
1	DA1-2489-000 000	B	1	SHEET, ACCESSORY SHOE	
2	XA4-8200-609 000	F	4	SCREW, CROSS-RECESS, FCH	
3	DA1-2486-000 000	B	1	SHOE, ACCESSORY	
4	DY2-1318-000 000	B	1	TOP COVER ASS'Y	A2HiE ONLY
	DY2-1319-000 000	B	1	TOP COVER ASS'Y	A2HiF ONLY
5	DA1-3767-000 000	B	1	VOLUME KNOB, HEADPHONE	
6	DG1-1209-000 000	C	1	HEADPHONE C.B.A.	
7	DY2-1283-000 000	B	1	ZOOM SWITCH (1)	
8	XA4-9200-509 000	F	36	SCREW, CROSS-RECESS, PH	
9	DG1-1562-000 000	B	1	COVER, REAR	A2HiE ONLY
	DG1-1567-000 000	B	1	COVER, REAR	A2HiF ONLY
10	DG1-1196-000 000	B	1	ZOOM SWITCH (2)	
11	DA1-3886-000 000	C	1	SHAFT	
12	DA1-3885-000 000	B	1	COVER (A), GRIP	
13	DA1-3884-000 000	C	1	HOLDER, GRIP COVER (A)	
14	DA1-2221-000 000	C	1	SPRING, PLATE	
15	XA4-9200-309 000	F	1	SCREW, CROSS-RECESS, PH	
16	DA1-3887-000 000	C	1	COVER, LITHIUM BATTERY	
17	DF1-0787-000 000	B	1	COVER, CASSETTE	A2HiE ONLY
	DF1-0788-000 000	B	1	COVER, CASSETTE	A2HiF ONLY
18	XA1-7200-259 000	F	2	SCREW, CROSS-RECESS, PH	
19	DA1-3590-000 000	A	2	SEAL	
20	DF1-0781-000 000	B	1	COVER, WHITE BALANCE SENSOR	
21	DH9-0497-000 000	C	1	MICROPHONE	
22	DA1-3906-000 000	B	1	KNOB, AUDIO VOLUME (R)	
23	DA1-3905-000 000	B	1	KNOB, AUDIO VOLUME (L)	
24	DG1-1204-000 000	B	1	LEFT COVER ASS'Y	
25	DA1-3918-000 000	B	1	STRAP, HAND	
26	DA1-3919-000 000	B	1	COVER (B), GRIP	
27	DA1-3911-000 000	B	1	KNOB, BATTERY	
28	DA1-2190-000 000	C	1	KNOB, EDIT	
29	DG1-1560-000 000	B	1	RIGHT COVER ASS'Y	A2HiE ONLY
	DG1-1565-000 000	B	1	RIGHT COVER ASS'Y	A2HiF ONLY
30	DA1-2214-000 000	C	1	HOLDER, JACK	
31	DS1-6067-000 000	C	1	SPRING, COIL	
32	DA1-3826-000 000	C	1	COVER, JACK	A2HiE ONLY
	DA1-3827-000 000	C	1	COVER, JACK	A2HiF ONLY
33	DA1-3815-000 000	B	1	KNOB, EJECT	
34	DA1-2211-000 000	C	1	SHAFT	
35	DA1-3807-000 000	B	1	SEAL	
36	XA1-7200-509 000	F	1	SCREW, CROSS-RECESS, PH	
37	DF1-0464-000 000	B	1	CAP, LENS	
38	DA1-2235-000 000	B	1	HOOD, LENS	
39	DA1-3908-000 000	C	1	SHEET, ATTENATOR	
40	DG1-1200-000 000	C	1	MIC JACK C.B.A.	

Lens/Camera Unit Section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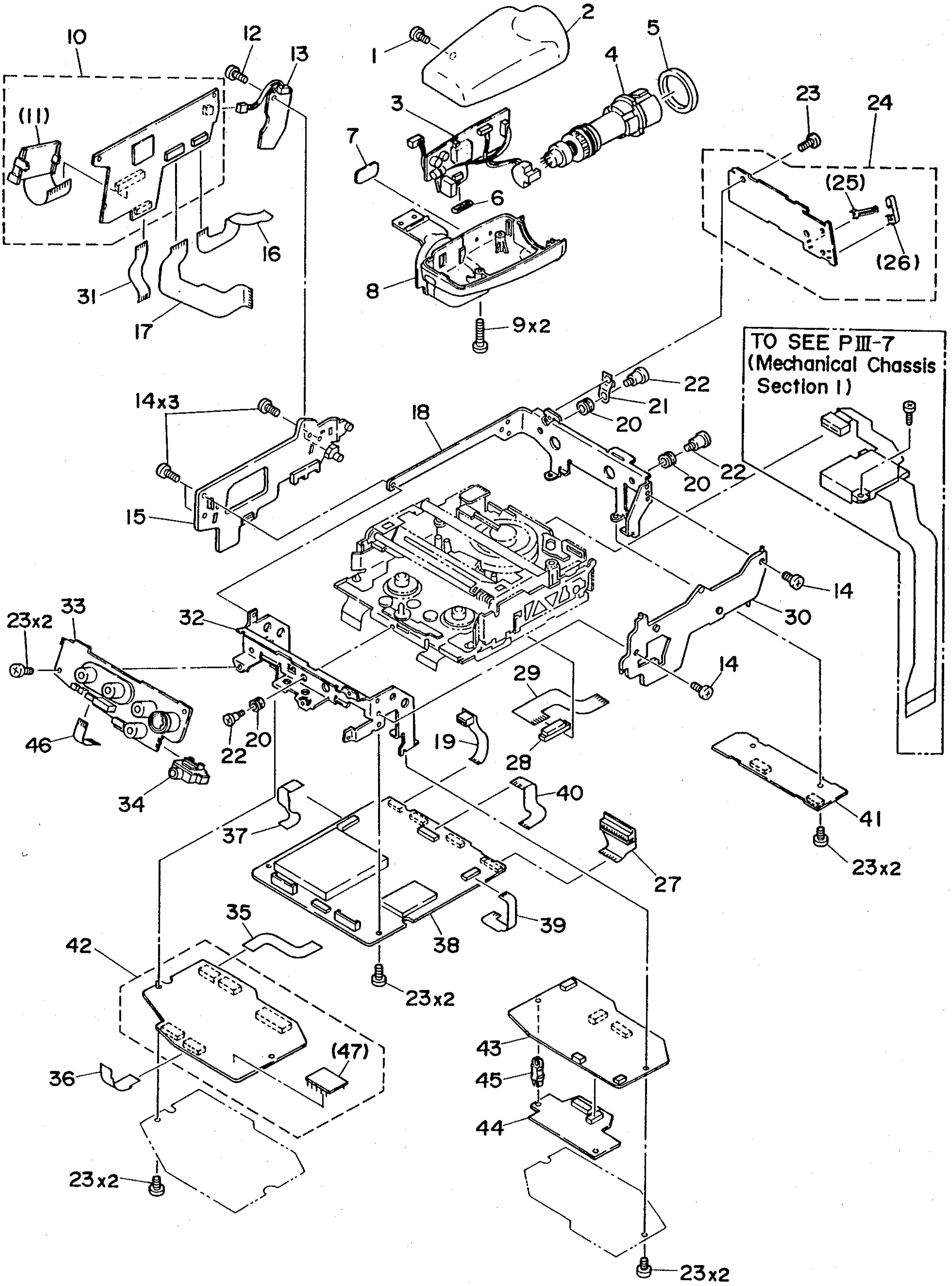
LENS UNIT
42
43
44
45
46x2
24x2
24x3

MECHANICAL PARTS

SYMBOL	PART NO.	CLASS	QTY	DESCRIPTION	REMARKS
1	XA4-4170-509 000	F	1	SCREW, CROSS-RECESS, PH	
2	YG9-5058-000 000	C	1	PHOTO REFLECTOR C.B.A.	
3	DY1-7127-000 000	C	1	FRONT LENS ASS'Y	
4	DA7-1697-000 000	C	1	RING, RUBBER	
5	DY1-7125-000 000	C	1	FOCUS RING ASS'Y	
6	DY1-7137-000 000	B	1	ZOOM LENS ASS'Y	
7	X91-1736-770 000	F	3	SCREW, CROSS-RECESS, PH	
8	DA7-2134-000 000	C	1	RING, STOPPER	
9	DG9-3406-000 000	C	1	ZOOM RING ASS'Y	
10	YG9-5062-000 000	C	1	IG METER	
11	XB4-6260-607 000	F	1	SCREW M2.6x6	
12	DA7-2146-000 000	F	1	SCREW	
13	XA4-9201-009 000	F	5	SCREW, CROSS-RECESS, PH	
14	DG9-3300-000 000	C	1	RELAY LENS ASS'Y	
15	YH7-0023-000 000	C	1	AF MOTOR ASS'Y	
16	YH7-0013-000 000	C	1	PZ MOTOR ASS'Y	
17	XA4-4170-609 000	F	2	SCREW, CROSS-RECESS	
18	XA4-3170-507 000	F	2	SCREW, CROSS-RECESS	
19	DG1-1373-000 000	C	1	PROCESS C.B.A.	
20	DH4-0272-000 000	C	1	MATRIX C.B.A.	
21	DH4-0333-000 000	C	1	ENCODER C.B.A.	
22	DH2-1312-000 000	C	1	PRINTED CORD	
23	DG1-1191-000 000	C	1	WHITE BALANCE SENSOR	
24	XA4-9200-509 000	F	17	SCREW, CROSS-RECESS, PH	
25	DH3-0017-000 000	C	1	DC/DC CONVERTER	
26	XA1-7260-609 000	F	1	SCREW, CROSS-RECESS, PH	
27	DA1-3792-000 000	C	1	HOLDER (2), CAMERA	
28	DY2-1315-000 000	C	1	ACTUATOR ASS'Y	
29	DH2-1336-000 000	C	1	PRINTED CORD	
30	DG1-1555-000 000	C	1	BATTERY CASE ASS'Y	
31	DS1-5232-000 000	C	1	SPRING, COIL	
32	DF1-0776-000 000	C	1	PLATE, LOCK	
33	DS1-5231-000 000	C	1	SPRING, COIL	
34	DA1-3802-000 000	C	1	HOOK, BATTERY LOCK (A)	
35	DA1-3804-000 000	C	1	PLATE, UNLOCK	
36	DA1-3803-000 000	C	1	HOOK, BATTERY LOCK (B)	
37	DA1-3808-000 000	C	1	SCREW, CROSS-RECESS	
38	DA1-3806-000 000	C	1	HOOK, BATTERY LOCK (C)	
39	DS1-6074-000 000	C	1	SPRING, COIL	
40	DG1-1214-000 000	C	1	FUSE BATTERY C.B.A.	
41	DA1-3805-000 000	C	2	TERMINAL, BATTERY	
42	DH2-1310-000 000	C	1	PRINTED CORD	
43	DA1-3791-000 000	C	1	HOLDER (1), CAMERA	
44	DG1-1193-000 000	C	1	CAMERA KEY C.B.A.	
45	DG1-1374-000 000	C	1	AF-KEY C.B.A.	
46	XA4-8200-509 000	F	2	SCREW, CROSS-RECESS, FCH	

EVF/Recorder Unit Section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(25)
(26)
TO SEE PIII-7
(Mechanical Chassis
Section 1)
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(47)
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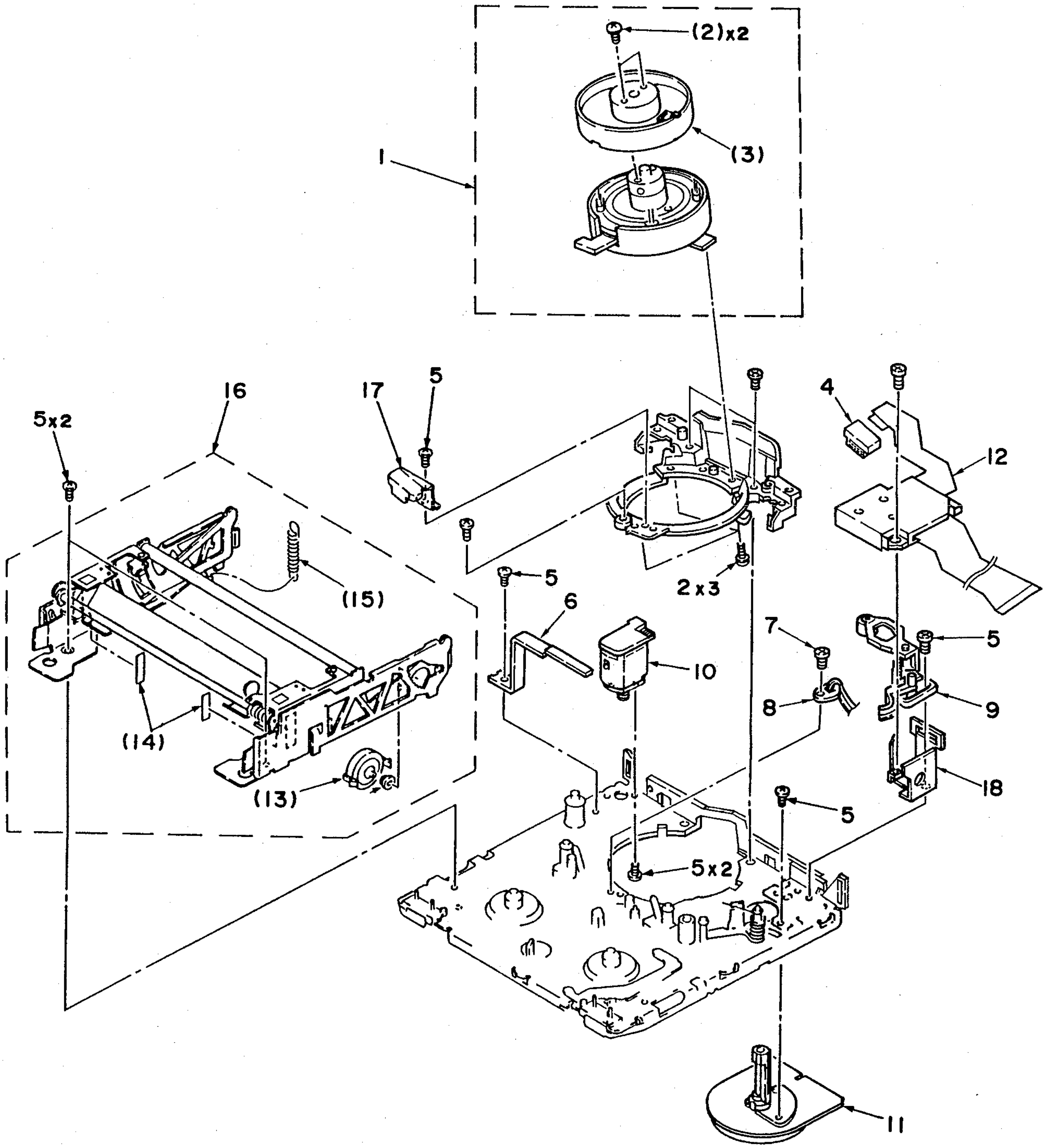
23x2

MECHANICAL PARTS

SYMBOL	PART NO.	CLASS	QTY	DESCRIPTION	REMARKS
1	XA1-7200-259 000	F	1	SCREW, CROSS-RECESS, PH	
2	DY2-1288-000 000	B	1	TOP COVER, E.V.F.	
3	DY2-1316-000 000	C	1	E.V.F. C.B.A.	
4	DY2-1291-000 000	C	1	CRT ASS'Y	
5	DA1-1864-000 000	B	1	RING, RUBBER	
6	DA1-3857-000 000	B	1	SLIDE SWITCH, E.V.F.	
7	DA1-1677-000 000	B	1	PLATE, COVER	
8	DY2-1289-000 000	B	1	BOTTOM COVER, E.V.F.	
9	XB4-6201-609 000	F	2	SCREW, CROSS-RECESS	
10	DG1-1215-000 000	C	1	RECORDER KEY (1) C.B.A.	A2HiE ONLY
	DY2-1317-000 000	C	1	RECORDER KEY (1) C.B.A.	A2HiF ONLY
11	DY2-1293-000 000	C	1	LCD ASS'Y	
12	XA1-7200-509 000	F	2	SCREW, CROSS-RECESS, PH	
13	DG1-1201-000 000	C	1	RECORDER KEY (3) C.B.A.	
14	XA9-0484-000 000	F	5	SCREW, CROSS-RECESS, FCH	
15	DA1-3751-000 000	C	1	HOLDER (1), RECORDER	
16	DH2-1309-000 000	C	1	PRINTED CORD	
17	DH2-1307-000 000	C	1	PRINTED CORD	
18	DA1-3754-000 000	C	1	HOLDER (4), RECORDER	
19	DF1-0778-000 000	C	1	PRINTED CORD ASS'Y	
20	DA1-3765-000 000	C	3	MECHA. DAMPER	
21	DA1-3756-000 000	C	1	PLATE, GROUND	
22	DA1-3755-000 000	F	3	SCREW, CROSS-RECESS	
23	XA1-7200-307 000	F	11	SCREW, CROSS-RECESS, PH	
24	DG1-1378-000 000	C	1	RECORDER KEY (2) C.B.A.	
25	DA1-3763-000 000	C	1	TERMINAL (2), LITHIUM BATTERY	
26	DA1-3762-000 000	C	1	TERMINAL (1), LITHIUM BATTERY	
27	DF1-0541-000 000	C	1	PRINTED CORD ASS'Y	
28	DH2-1250-000 000	C	1	CONNECTOR 11P	
29	DH2-1301-000 000	C	1	PRINTED CORD	
30	DA1-3752-000 000	C	1	HOLDER (2), RECORDER	
31	DH2-1318-000 000	C	1	PRINTED CORD	
32	DF1-0789-000 000	C	1	HOLDER (3), RECORDER	
33	DG1-1182-000 000	C	1	TERMINAL C.B.A.	
34	DG1-1185-000 000	C	1	CONTROL JACK C.B.A.	
35	DH2-1308-000 000	C	1	PRINTED CORD	
36	DH2-1303-000 000	C	1	PRINTED CORD	
37	DH2-1304-000 000	C	1	PRINTED CORD	
38	DG1-1211-000 000	C	1	SYSCON SERVO C.B.A.	
39	DH2-1337-000 000	C	1	PRINTED CORD	
40	DH2-1305-000 000	C	1	PRINTED CORD	
41	DG1-1212-000 000	C	1	VIDEO SUB C.B.A.	
42	DG1-1210-000 000	C	1	VIDEO C.B.A.	
43	DG1-1213-000 000	C	1	AUDIO (1) C.B.A.	
44	DG1-1198-000 000	C	1	AUDIO (2) C.B.A.	
45	DA1-3764-000 000	C	1	HOLDER, C.B.A.	
46	DH2-1311-000 000	C	1	PRINTED CORD	
47	DH4-0301-000 000	C	1	JOG C.B.A.	

Mechanical Chassis Section I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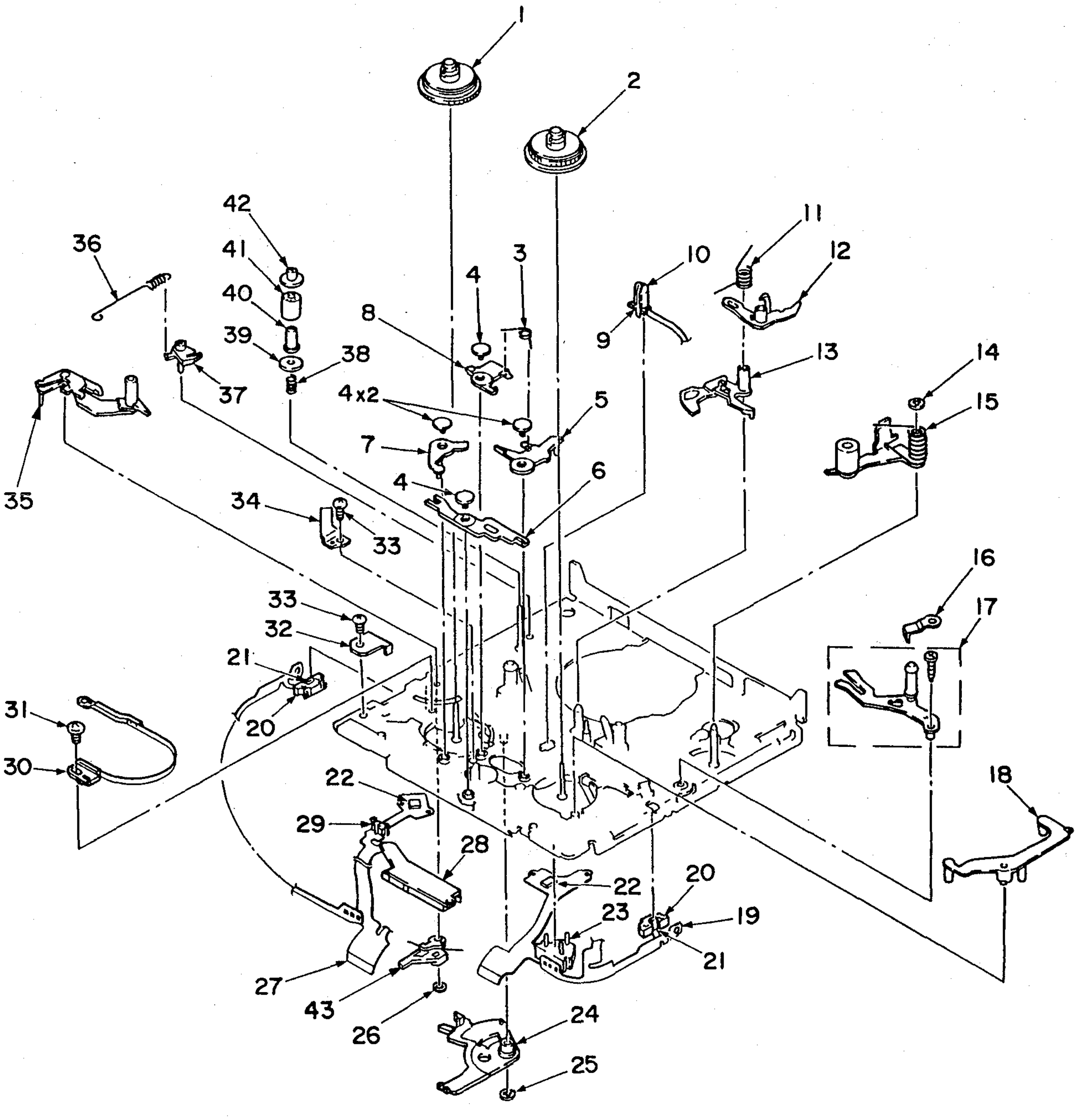
MECHANICAL PARTS

SYMBOL	PART NO.	CLASS	QTY	DESCRIPTION	REMARKS
1	DY4-2936-000 000	E	1	DRUM ASS'Y	
2	DY4-2730-000 000	F	5	SCREW, CROSS-RECESS	
3	DY4-2937-000 000	E	1	UPPER DRUM ASS'Y	
4	DY4-2920-000 000	C	1	CONNECTOR 13P	
5	DY4-2727-000 000	F	8	SCREW, CROSS-RECESS	
6	DY4-2675-000 000	C	1	TERMINAL, EARTH	
7	DY4-2728-000 000	F	1	SCREW, CROSS-RECESS	
8	Y22-8120-000 000	B	1	SENSOR, DEW	
9	DY4-2910-000 000	C	1	ROLLER ASS'Y	
10	DY4-2911-000 000	C	1	LODING MOTOR ASS'Y	
11	DY4-2726-000 000	C	1	CAPSTAN MOTOR	
12	DY4-2938-000 000	C	1	HEAD AMP ASS'Y	
13	DY4-2720-000 000	C	1	DAMPER, OIL	
14	DY4-2729-000 000	C	2	TAPE	
15	DY4-2708-000 000	C	1	SPRING, COIL	
16	DY4-2673-000 000	C	1	CASSETTE, COMPARTMENT ASS'Y	
17	DY4-2721-000 000	C	1	GUARD, GUIDE	
18	DY4-2925-000 000	C	1	HOLDER	

Mechanical Chassis Section 2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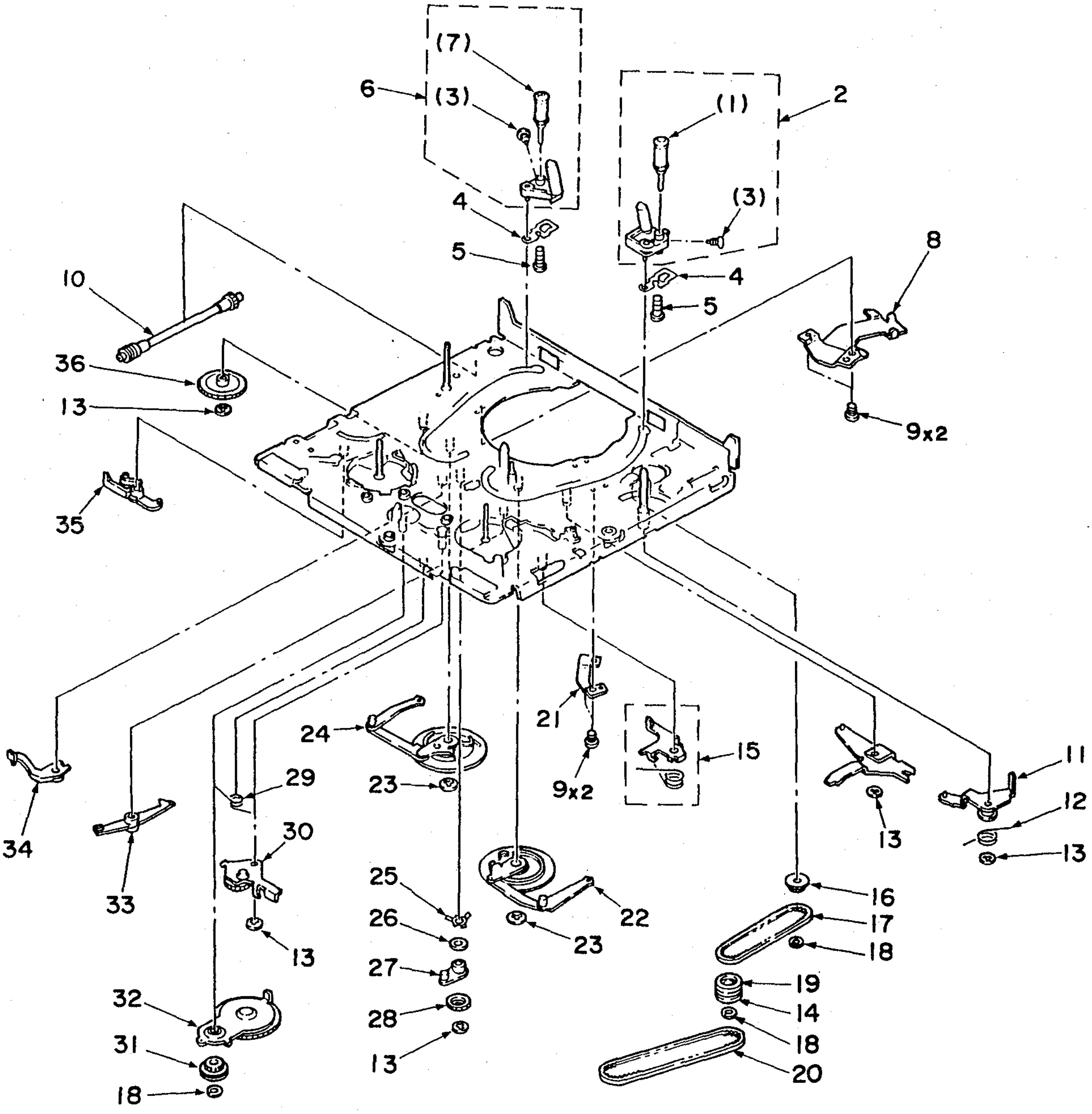
MECHANICAL PARTS

SYMBOL	PART NO.	CLASS	QTY	DESCRIPTION	REMARKS
1	DY4-2663-000 000	C	1	REEL, SUPPLY	
2	DY4-2666-000 000	C	1	REEL, TAKE UP	
3	DY4-2699-000 000	C	1	SPRING, COIL	
4	DY4-2696-000 000	C	4	PIN, SHAFT	
5	DY4-2714-000 000	C	1	BRAKE, T	
6	DY4-2692-000 000	C	1	LEVER, LB	
7	DY4-2691-000 000	C	1	BRAKE, LB	
8	DY4-2713-000 000	C	1	BRAKE, S	
9	DY4-2710-000 000	C	1	HOLDER, LED	
10	Y22-8012-000 000	B	1	LED GL452S	
11	DY4-2697-000 000	C	1	SPRING, COIL	
12	DY4-2716-000 000	C	1	ARM, STOPPER	
13	DY4-2723-000 000	C	1	STOPPER, RK	
14	DY4-2440-000 000	F	1	WASHER	
15	DY4-2912-000 000	C	1	ARM, PINCH	
16	DY4-2707-000 000	C	1	SPRING, PLATE	
17	DY4-2664-000 000	C	1	ARM, TG7	
18	DY4-2712-000 000	C	1	ARM, RELEASE	
19	DY4-2680-000 000	C	1	FLEXIBLE P.C.B. (2)	
20	DY4-2722-000 000	C	2	HOLDER, SENSOR	
21	Y22-8123-000 000	B	2	PHOTO TRANSISTOR EE-P109	
22	Y22-8121-000 000	B	2	PHOTO IC SPI-315-25-CD	
23	DY4-2678-000 000	C	1	SWITCH, PUSH	
24	DY4-2917-000 000	C	1	LEVER, SWITCH	
25	DY4-2688-000 000	F	1	WASHER	
26	DY4-2681-000 000	F	1	WASHER	
27	DY4-2679-000 000	C	1	FLEXIBLE P.C.B. (1)	
28	DY4-2921-000 000	C	1	SWITCH, SLIDE	
29	DY4-2676-000 000	C	1	SWITCH	
30	DY4-2660-000 000	C	1	BAND, TENSION	
31	DY4-2727-000 000	F	1	SCREW, CROSS-RECESS	
32	DY4-2725-000 000	C	1	PLATE, SWITCH	
33	DY4-2728-000 000	F	2	SCREW, CROSS-RECESS	
34	DY4-2690-000 000	C	1	PLATE, TL	
35	DY4-2669-000 000	C	1	ARM	
36	DY4-2724-000 000	C	1	SPRING, COIL	
37	DY4-2717-000 000	C	1	ARM, ADJUST	
38	DY4-2705-000 000	C	1	SPRING, COIL	
39	DY4-2701-000 000	C	1	FLANGE, TG2	
40	DY4-2704-000 000	C	1	SLEEVE, TG2	
41	DY4-2702-000 000	C	1	ROLLER, TG2	
42	DY4-2703-000 000	C	1	FLANGE, TG2	
43	DY4-2914-000 000	C	1	STOPPER	

Mechanical Chassis Section 3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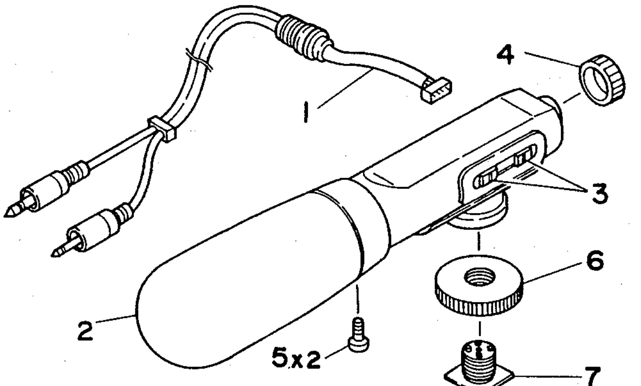
MECHANICAL PARTS

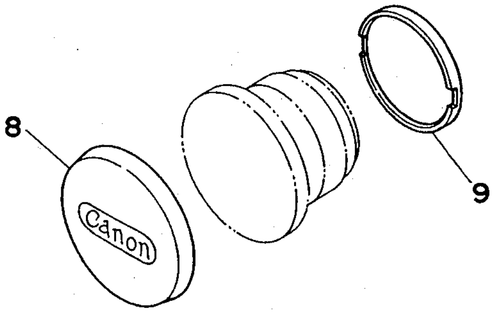
SYMBOL	PART NO.	CLASS	QTY	DESCRIPTION	REMARKS
1	DY4-2674-000 000	C	1	ROLLER, GUIDE	
2	DY4-2649-000 000	C	1	COASTER, RIGHT	
3	DY4-2686-000 000	F	2	SCREW, CROSS-RECESS	
4	DY4-2685-000 000	C	2	SPRING, LEAF	
5	DY4-2689-000 000	F	2	SCREW, CROSS-RECESS	
6	DY4-2648-000 000	C	1	COASTER, LEFT	
7	DY4-2662-000 000	C	1	ROLLER, GUIDE	
8	DY4-2672-000 000	C	1	PLATE, SS	
9	DY4-2728-000 000	F	4	SCREW, CROSS-RECESS	
10	DY4-2919-000 000	C	1	WORM ASS'Y	
11	DY4-2665-000 000	C	1	ARM, PINCH SUB	
12	DY4-2706-000 000	C	1	SPRING, COIL	
13	DY4-2688-000 000	F	5	WASHER	
14	DY4-2922-000 000	C	1	PULLEY, RELAY B	
15	DY4-2659-000 000	C	1	BRAKE, TS	
16	DY4-2656-000 000	C	1	GEAR, JOINT	
17	DY4-2719-000 000	E	1	BELT(S), TIMING	
18	DY4-2681-000 000	F	3	WASHER	
19	DY4-2671-000 000	C	1	PULLEY, RELAY A	
20	DY4-2923-000 000	C	1	BELT(L), TIMING	
21	DY4-2684-000 000	C	1	PLATE, TT	
22	DY4-2743-000 000	C	1	GEAR	
23	DY4-2440-000 000	F	2	WASHER	
24	DY4-2742-000 000	C	1	GEAR	
25	DY4-2700-000 000	C	1	SPRING	
26	DY4-2527-000 000	F	1	WASHER	
27	DY4-2695-000 000	C	1	ARM, UL	
28	DY4-2694-000 000	C	1	GEAR, UL	
29	DY4-2698-000 000	C	1	SPRING, COIL	
30	DY4-2650-000 000	C	1	GEAR ASS'Y	
31	DY4-2915-000 000	C	1	GEAR, RC	
32	DY4-2918-000 000	C	1	GEAR, RK	
33	DY4-2693-000 000	C	1	ARM, RELEASE	
34	DY4-2715-000 000	C	1	BRAKE, UL	
35	DY4-2711-000 000	C	1	LEVER, EJECT	
36	DY4-2924-000 000	C	1	GEAR, WHEEL	

No. 7

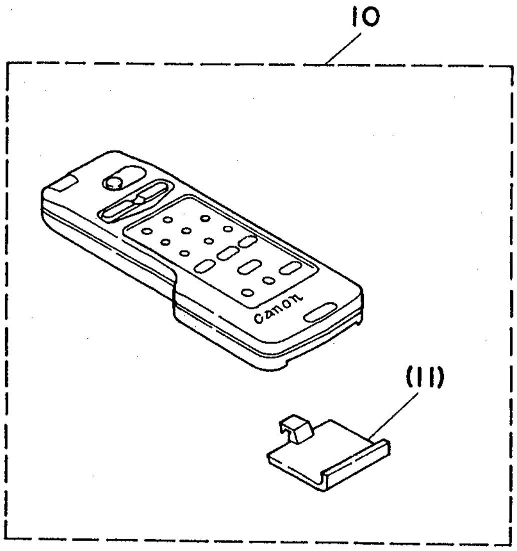
Accessory Parts Section



MM-200



WD-55, TL-55



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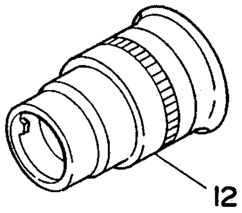

SF-200

MECHANICAL PARTS

SYMBOL	PART NO.		CLASS	QTY	DESCRIPTION	REMARKS
1	DH2-1072-000	000	C	1	CORD ASS'Y	
2	DA8-0199-000	000	B	1	WIND SCREEN	
3	DA8-0195-000	000	C	2	SLIDE SWITCH	
4	DA8-0194-000	000	B	1	KNOB	
5	XB4-6201-609	000	F	2	SCREW, CROSS-RECESS	
6	CA4-4292-000	000	C	1	RING	
7	DA8-0188-000	000	C	1	SHOE	
8	DA7-1769-000	000	C	1	CAP, LENS	
9	DA7-1770-000	000	C	1	CAP, DUST	
10	DY2-6018-000	000	B	1	WIRELESS REMOTE CONTROLLER WL-100	A2HiE ONLY
	DY2-6020-000	000	B	1	WIRELESS REMOTE CONTROLLER WL-100	A2HiF ONLY
11	DY3-4197-000	000	B	1	COVER, BATTERY	
12	DY2-1223-000	000	B	1	SPORTS FINDER SF-200	

ELECTRICAL PARTS

SYMBOL	PART NO.	CLASS	QTY	DESCRIPTION	REMARKS
⚠ C2911	VC6-4130-106 000	D	1	CAPACITOR, ELEC. 10μF/16V	
⚠ C2915	VC7-1360-102 000	D	1	CAPACITOR, CERA 1000pF/1KV	
⚠ C2917	VC7-1380-152 000	D	1	CAPACITOR, CERA 1500pF/500V	
CN001	VS1-5127-012 000	C	1	CONNECTOR 12P	
CN002	VS1-5051-008 000	C	1	CONNECTOR 8P	
CN006	VS1-5127-020 000	C	1	CONNECTOR 20P	
CN007	VS1-1169-026 000	C	1	CONNECTOR 26P	
CN101	VS1-1169-010 000	C	1	CONNECTOR 10P	
CN102	VS1-1169-015 000	C	1	CONNECTOR 15P	
CN103	VS1-5127-016 000	C	1	CONNECTOR 16P	
CN201	VS1-5149-008 000	C	1	CONNECTOR 8P	
CN202	VS1-5149-008 000	C	1	CONNECTOR 8P	
CN204	VS1-5127-016 000	C	1	CONNECTOR 16P	
CN205	VS1-5127-024 000	C	1	CONNECTOR 24P	
CN206	VS1-1169-022 000	C	1	CONNECTOR 22P	
CN207	VS1-5127-012 000	C	1	CONNECTOR 12P	
CN904	VS1-5105-010 000	C	1	CONNECTOR 10P	
CN905	VS1-5127-016 000	C	1	CONNECTOR 16P	
CN1401	VS1-5149-008 000	C	1	CONNECTOR 8P	
CN1501	VS1-5127-016 000	C	1	CONNECTOR 16P	
CN1601	VS1-1169-005 000	C	1	CONNECTOR 5P	
CN1603	VS1-5127-024 000	C	1	CONNECTOR 24P	
CN1604	VS1-5127-016 000	C	1	CONNECTOR 16P	
CN1606	VS1-0876-013 000	C	1	CONNECTOR 13P	
CN1607	VS1-5127-020 000	C	1	CONNECTOR 20P	
CN1608	VS1-0876-011 000	C	1	CONNECTOR 11P	
CN1701	VS1-5127-012 000	C	1	CONNECTOR 12P	
CN1702	VS1-5127-016 000	C	1	CONNECTOR 16P	
CN1801	VS1-5106-010 000	C	1	CONNECTOR 10P	
CN1901	VS1-5127-012 000	C	1	CONNECTOR 12P	
CN1953	VS1-0878-002 000	C	1	CONNECTOR 2P	
CN2101	VS1-1169-020 000	C	1	CONNECTOR 20P	
CN2102	VS1-1021-008 000	C	1	CONNECTOR 8P	
CN2106	VS1-5127-024 000	C	1	CONNECTOR 24P	
CN2108	VS1-1169-006 000	C	1	CONNECTOR 6P	
CN2401	VS1-5127-024 000	C	1	CONNECTOR 24P	
CN2405	VS1-0331-002 000	C	1	CONNECTOR 2P	
CN2407	VS1-1180-010 000	C	1	CONNECTOR 10P	
CN2601	VS1-1169-006 000	C	1	CONNECTOR 6P	
D001	WA1-1146-000 000	B	1	DIODE MA707	
D002	WA1-1084-000 000	B	1	DIODE MA110	
D003	WA1-1146-000 000	B	1	DIODE MA707	
D004	WA1-1084-000 000	B	1	DIODE MA110	
D005	WA1-0962-000 000	B	1	DIODE MA121	
D101	WA1-1084-000 000	B	1	DIODE MA110	
D102	WA1-0384-000 000	B	1	ZENER DIODE RD5.6MB2	
D103	WA1-5080-000 000	B	1	DIODE EC10QS03	
D104	WA1-5080-000 000	B	1	DIODE EC10QS03	
D105	WA1-1084-000 000	B	1	DIODE MA110	
D301	WA1-0953-000 000	B	1	DIODE MA716	
D302	WA1-1084-000 000	B	1	DIODE MA110	
D303	WA1-1084-000 000	B	1	DIODE MA110	
D304	WA1-1084-000 000	B	1	DIODE MA110	
D305	WA1-1164-000 000	B	1	DIODE DAN202U	
D306	WA1-5205-000 000	B	1	DIODE DA112	
D307	WA1-1152-000 000	B	1	DIODE DA114	
D308	WA1-1084-000 000	B	1	DIODE MA110	
D309	WA1-1084-000 000	B	1	DIODE MA110	
D1601	WA1-1084-000 000	B	1	DIODE MA110	
D1602	WA1-0962-000 000	B	1	DIODE MA121	

ELECTRICAL PARTS

SYMBOL	PART NO.	CLASS	QTY	DESCRIPTION	REMARKS
D1603	WA1-1084-000 000	B	1	DIODE MA110	
D1604	WA1-1084-000 000	B	1	DIODE MA110	
D1605	WA1-1084-000 000	B	1	DIODE MA110	
D2101	WA1-1084-000 000	B	1	DIODE MA110	
D2102	WA1-0962-000 000	B	1	DIODE MA121	
D2103	WA1-0962-000 000	B	1	DIODE MA121	
D2104	WA1-1221-000 000	B	1	VARIABLE CAPACITANCE DIODE MA341S	
D2105	WA1-1084-000 000	B	1	DIODE MA110	
D2106	WA1-0962-000 000	B	1	DIODE MA121	
D2201	WA1-1084-000 000	B	1	DIODE MA110	
D2203	WA1-1084-000 000	B	1	DIODE MA110	
D2204	WA1-1084-000 000	B	1	DIODE MA110	
D2207	WA1-1084-000 000	B	1	DIODE MA110	
D2401	WA1-1084-000 000	B	1	DIODE MA110	
D2402	WA1-5061-000 000	B	1	DIODE DAP202U	
D2403	WA1-1084-000 000	B	1	DIODE MA110	
D2404	WA1-1084-000 000	B	1	DIODE MA110	
D2405	WA1-1149-000 000	B	1	DIODE 1SS250	
D2406	WA1-1149-000 000	B	1	DIODE 1SS250	
D2407	WA1-0963-000 000	B	1	ZENER DIODE MA3A100	
D2408	WA1-0963-000 000	B	1	ZENER DIODE MA3A100	
D2409	WA1-0963-000 000	B	1	ZENER DIODE MA3A100	
D2410	WA1-0963-000 000	B	1	ZENER DIODE MA3A100	
D2411	WA1-0962-000 000	B	1	DIODE MA121	
D2412	WA1-0962-000 000	B	1	DIODE MA121	
D2413	WA1-5141-000 000	B	1	DIODE UMN11	
D2414	WA1-5122-000 000	B	1	DIODE DAN222	
D2415	WA1-5141-000 000	B	1	DIODE UMN11	
D2416	WA1-5122-000 000	B	1	DIODE DAN222	
D2417	WA1-5122-000 000	B	1	DIODE DAN222	
D2901	WA1-0989-000 000	B	1	ZENER DIODE MA3100W	
D2902	WA1-1084-000 000	B	1	DIODE MA110	
D2903	WA1-1084-000 000	B	1	DIODE MA110	
D2904	WA1-1123-000 000	B	1	DIODE AG01Z	
IC001	DH4-0257-000 000	B	1	IC μPD75312GF-035	
IC002	DH4-0236-000 000	B	1	IC MM1019	
IC003	WA3-5455-000 000	B	1	IC SC7SU04F	
IC004	WA3-5455-000 000	B	1	IC SC7SU04F	
IC101	DH4-0303-000 000	B	1	IC CXP80116-563Q	
IC102	WA4-5127-000 000	B	1	IC CXA8006M	
IC103	WA4-5161-000 000	B	1	IC CXA1512M	
IC104	DH4-0318-000 000	B	1	IC CXA1127AM	
IC105	WA3-5491-000 000	B	1	IC HD74HC165FP	
IC201	DH4-0263-000 000	B	1	IC CXA1207R	
IC202	DH4-0264-000 000	B	1	IC CXA1208R	
IC204	DH4-0297-000 000	B	1	IC CXL1506M	
IC205	DH4-0297-000 000	B	1	IC CXL1506M	
IC207	WA4-1292-000 000	B	1	IC LVA522F-2	
IC208	WA4-5050-000 000	B	1	IC LVA523F	
IC212	DH4-0362-000 000	B	1	IC μPD6144AG-604	
IC213	DH4-0155-000 000	B	1	IC μPD6145G-101	
IC214	WA3-5455-000 000	B	1	IC SC7SU04F	
IC215	WA3-5122-000 000	B	1	IC SC7S32F	
IC301	DH4-0205-000 000	B	1	IC LVC556F-2	
IC303	DH4-0298-000 000	B	1	IC MM1029AFF	
IC1501	DH4-0205-000 000	B	1	IC LVC556F-2	
IC1502	DH4-0327-000 000	B	1	IC CXD1171M	
IC1503	DH4-0322-000 000	B	1	IC CXD1175AM	
IC1504	WA4-1332-000 000	B	1	IC NJM2406F	
IC1505	DH4-0321-000 000	B	1	IC CXD1172AM	

ELECTRICAL PARTS

SYMBOL	PART NO.	CLASS	QTY	DESCRIPTION	REMARKS
IC1506	DH4-0325-000 000	B	1	IC CF38403PJ	
IC1507	DH4-0326-000 000	B	1	IC CF78125PJ	
IC1508	WA3-5548-000 000	B	1	IC TMS4C1050-4DL	
IC1509	DH4-0278-000 000	B	1	IC ZA4010	
IC1510	WA3-5201-000 000	B	1	IC MN3106S	
IC1601	DH4-0302-000 000	B	1	IC μPD75116GF-739	
IC1602	DH4-0205-000 000	B	1	IC LVC556F-2	
IC1603	WA4-5129-000 000	B	1	IC S-87050AF	
IC1604	DH4-0213-000 000	B	1	IC μPD7564G-533	
IC1605	WA3-5597-000 000	B	1	IC SC7S08F	
IC2101	WA4-5042-000 000	B	1	IC CXD1250M	
IC2102	WA4-5043-000 000	B	1	IC CXD1255Q	
IC2103	WA4-5044-000 000	B	1	IC CXD1159Q	
IC2104	WA3-5334-000 000	B	1	IC TC74AC04F	
IC2201	WA3-5335-000 000	B	1	IC TC74HC4066AF	
IC2202	WA4-5045-000 000	B	1	IC CXA1337R	
IC2205	DH4-0310-000 000	B	1	IC M37450M4-480FP	
IC2206	WA3-3175-000 000	B	1	IC BU4066BF	
IC2208	WA4-5129-000 000	B	1	IC S-87050AF	
IC2209	WA3-5392-000 000	B	1	IC S-2917IF	
IC2210	WA4-1248-000 000	B	1	IC μPC324G2	
IC2211	WA4-1248-000 000	B	1	IC μPC324G2	
IC2212	WA4-0458-000 000	B	1	IC NJM3414M	
IC2213	WA3-5122-000 000	B	1	IC SC7S32F	
IC2214	WA3-5122-000 000	B	1	IC SC7S32F	
IC2215	WA4-1248-000 000	B	1	IC μPC324G2	
IC2401	DH4-0281-000 000	B	1	IC LD5077	
IC2402	DH4-0280-000 000	B	1	IC CM7056	
IC2403	DH4-0311-000 000	B	1	IC M37450M4-481FP	
IC2404	WA3-0974-000 000	B	1	IC TC4011BF	
IC2405	WA3-4264-000 000	B	1	IC SC14S66F	
IC2406	WA3-5173-000 000	B	1	IC SC7S00F	
IC2407	WA3-3938-000 000	B	1	IC SC14S81F	
IC2408	WA4-1293-000 000	B	1	IC PST529CMT	
IC2409	WA4-5141-000 000	B	1	IC MM1036XFF	
IC2410	WA4-5167-000 000	B	1	IC LB1830M	
IC2411	WA4-5213-000 000	B	1	IC RH5RE50A	
IC2412	WA4-1172-000 000	B	1	IC NJM3415M	
IC2413	WA3-4264-000 000	B	1	IC SC14S66F	
IC2414	WA3-5173-000 000	B	1	IC SC7S00F	
IC2415	WA3-5173-000 000	B	1	IC SC7S00F	
IC2416	WA3-5173-000 000	B	1	IC SC7S00F	
IC2901	WA4-1322-000 000	B	1	IC AN2514S	
IC2931	DH4-0205-000 000	B	1	IC LVC556F-2	
L1951	DH9-0405-000 000	C	1	COIL, FERRITE 2μH	
⚠ L2902	DH9-0512-000 000	D	1	COIL 210μH	
LED2941	WG1-0417-000 000	B	1	LED SLH-56VT144F	
Q001	WA2-1400-000 000	B	1	TRANSISTOR 2SA1576	
Q002	WA2-1235-000 000	B	1	TRANSISTOR IMB6	
Q003	WA2-1378-000 000	B	1	TRANSISTOR DTC144EU	
Q004	WA2-1378-000 000	B	1	TRANSISTOR DTC144EU	
Q101	WA2-1377-000 000	B	1	TRANSISTOR DTC143EU	
Q102	WA2-1377-000 000	B	1	TRANSISTOR DTC143EU	
Q103	WA2-5088-000 000	B	1	TRANSISTOR DTC114EU	
Q104	WA2-1230-000 000	B	1	TRANSISTOR IMH6	
Q105	WA2-0797-000 201	B	1	TRANSISTOR 2SA1213	
Q106	WA2-0797-000 201	B	1	TRANSISTOR 2SA1213	
Q107	WA2-1240-000 000	B	1	TRANSISTOR IMT1	
Q108	WA2-5267-000 000	B	1	TRANSISTOR IMD1	
Q201	WA2-1231-000 000	B	1	TRANSISTOR IMH8	

ELECTRICAL PARTS

SYMBOL	PART NO.	CLASS	QTY	DESCRIPTION	REMARKS
Q202	WA2-1231-000 000	B	1	TRANSISTOR IMH8	
Q203	WA2-1232-000 000	B	1	TRANSISTOR IMZ1	
Q204	WA2-1230-000 000	B	1	TRANSISTOR IMH6	
Q205	WA2-5051-000 000	B	1	TRANSISTOR DTA144EU	
Q208	WA2-1230-000 000	B	1	TRANSISTOR IMH6	
Q209	WA2-1230-000 000	B	1	TRANSISTOR IMH6	
Q210	WA2-5051-000 000	B	1	TRANSISTOR DTA144EU	
Q211	WA2-1378-000 000	B	1	TRANSISTOR DTC144EU	
Q212	WA2-1230-000 000	B	1	TRANSISTOR IMH6	
Q254	WA2-1400-000 000	B	1	TRANSISTOR 2SA1576	
Q255	WA2-1234-000 000	B	1	TRANSISTOR IMX2	
Q257	WA2-1400-000 000	B	1	TRANSISTOR 2SA1576	
Q302	WA2-1400-000 000	B	1	TRANSISTOR 2SA1576	
Q303	WA2-1228-000 000	B	1	TRANSISTOR IMT2	
Q304	WA2-1234-000 000	B	1	TRANSISTOR IMX2	
Q305	WA2-1234-000 000	B	1	TRANSISTOR IMX2	
Q306	WA2-1232-000 000	B	1	TRANSISTOR IMZ1	
Q308	WA2-5092-000 000	B	1	TRANSISTOR IMX5	
Q313	WA2-1400-000 000	B	1	TRANSISTOR 2SA1576	
Q315	WA2-1400-000 000	B	1	TRANSISTOR 2SA1576	
Q316	WA2-1337-000 000	B	1	TRANSISTOR 2SC4081	
Q317	WA2-1337-000 000	B	1	TRANSISTOR 2SC4081	
Q318	WA2-1234-000 000	B	1	TRANSISTOR IMX2	
Q319	WA2-5062-000 000	B	1	TRANSISTOR DTC144TU	
Q321	WA2-1337-000 000	B	1	TRANSISTOR 2SC4081	
Q323	WA2-1416-000 000	B	1	TRANSISTOR IMB5	
Q324	WA2-1234-000 000	B	1	TRANSISTOR IMX2	
Q326	WA2-1405-000 000	B	1	TRANSISTOR DTA124EU	
Q327	WA2-1198-000 000	B	1	TRANSISTOR IMD2	
Q328	WA2-1198-000 000	B	1	TRANSISTOR IMD2	
Q333	WA2-1337-000 000	B	1	TRANSISTOR 2SC4081	
Q334	WA2-1256-000 000	B	1	TRANSISTOR IMH5	
Q336	WA2-5149-000 000	B	1	TRANSISTOR 2SB1412F5	
Q337	WA2-5152-000 000	B	1	TRANSISTOR 2SB1424	
Q338	WA2-1378-000 000	B	1	TRANSISTOR DTC144EU	
Q339	WA2-1228-000 000	B	1	TRANSISTOR IMT2	
Q340	WA2-1228-000 000	B	1	TRANSISTOR IMT2	
Q343	WA2-1400-000 000	B	1	TRANSISTOR 2SA1576	
Q344	WA2-1256-000 000	B	1	TRANSISTOR IMH5	
Q346	WA2-1337-000 000	B	1	TRANSISTOR 2SC4081	
Q348	WA2-1406-000 000	B	1	TRANSISTOR DTC124EU	
Q349	WA2-1234-000 000	B	1	TRANSISTOR IMX2	
Q351	WA2-1400-000 000	B	1	TRANSISTOR 2SA1576	
Q353	WA2-1405-000 000	B	1	TRANSISTOR DTA124EU	
Q356	WA2-1232-000 000	B	1	TRANSISTOR IMZ1	
Q360	WA2-5131-000 000	B	1	TRANSISTOR RU201	
Q361	WA2-1378-000 000	B	1	TRANSISTOR DTC144EU	
Q370	WA2-1234-000 000	B	1	TRANSISTOR IMX2	
Q371	WA2-1234-000 000	B	1	TRANSISTOR IMX2	
Q372	WA2-1228-000 000	B	1	TRANSISTOR IMT2	
Q373	WA2-1228-000 000	B	1	TRANSISTOR IMT2	
Q374	WA2-1234-000 000	B	1	TRANSISTOR IMX2	
Q375	WA2-1234-000 000	B	1	TRANSISTOR IMX2	
Q376	WA2-1378-000 000	B	1	TRANSISTOR DTC144EU	
Q377	WA2-1198-000 000	B	1	TRANSISTOR IMD2	
Q378	WA2-1198-000 000	B	1	TRANSISTOR IMD2	
Q380	WA2-1337-000 000	B	1	TRANSISTOR 2SC4081	
Q381	WA2-1337-000 000	B	1	TRANSISTOR 2SC4081	
Q382	WA2-1337-000 000	B	1	TRANSISTOR 2SC4081	
Q383	WA2-1400-000 000	B	1	TRANSISTOR 2SA1576	

ELECTRICAL PARTS

SYMBOL	PART NO.	CLASS	QTY	DESCRIPTION	REMARKS
Q384	WA2-1378-000 000	B	1	TRANSISTOR DTC144EU	
Q385	WA2-1400-000 000	B	1	TRANSISTOR 2SA1576	
Q386	WA2-1198-000 000	B	1	TRANSISTOR IMD2	
Q387	WA2-1230-000 000	B	1	TRANSISTOR IMH6	
Q388	WA2-5168-000 000	B	1	FET 2SK879 (Y/GR)	
Q389	WA2-1337-000 000	B	1	TRANSISTOR 2SC4081	
Q390	WA2-1232-000 000	B	1	TRANSISTOR IMZ1	
Q391	WA2-1378-000 000	B	1	TRANSISTOR DTC144EU	
Q392	WA2-1337-000 000	B	1	TRANSISTOR 2SC4081	
Q393	WA2-1378-000 000	B	1	TRANSISTOR DTC144EU	
Q394	WA2-5169-000 000	B	1	FET 2SK880 (GR,BL)	
Q1501	WA2-5149-000 000	B	1	TRANSISTOR 2SB1412F5	
Q1502	WA2-1400-000 000	B	1	TRANSISTOR 2SA1576	
Q1503	WA2-1400-000 000	B	1	TRANSISTOR 2SA1576	
Q1504	WA2-1228-000 000	B	1	TRANSISTOR IMT2	
Q1505	WA2-1232-000 000	B	1	TRANSISTOR IMZ1	
Q1506	WA2-1228-000 000	B	1	TRANSISTOR IMT2	
Q1507	WA2-1232-000 000	B	1	TRANSISTOR IMZ1	
Q1508	WA2-1400-000 000	B	1	TRANSISTOR 2SA1576	
Q1509	WA2-1337-000 000	B	1	TRANSISTOR 2SC4081	
Q1510	WA2-1337-000 000	B	1	TRANSISTOR 2SC4081	
Q1511	WA2-1232-000 000	B	1	TRANSISTOR IMZ1	
Q1512	WA2-1337-000 000	B	1	TRANSISTOR 2SC4081	
Q1513	WA2-1234-000 000	B	1	TRANSISTOR IMX2	
Q1514	WA2-1337-000 000	B	1	TRANSISTOR 2SC4081	
Q1515	WA2-1400-000 000	B	1	TRANSISTOR 2SA1576	
Q1517	WA2-1337-000 000	B	1	TRANSISTOR 2SC4081	
Q1518	WA2-1337-000 000	B	1	TRANSISTOR 2SC4081	
Q1601	WA2-1231-000 000	B	1	TRANSISTOR IMH8	
Q1602	WA2-1378-000 000	B	1	TRANSISTOR DTC144EU	
Q1604	WA2-0797-000 201	B	1	TRANSISTOR 2SA1213	
Q1605	WA2-1400-000 000	B	1	TRANSISTOR 2SA1576	
Q1606	WA2-1378-000 000	B	1	TRANSISTOR DTC144EU	
Q1607	WA2-5051-000 000	B	1	TRANSISTOR DTA144EU	
Q1608	WA2-0797-000 201	B	1	TRANSISTOR 2SA1213	
Q1609	WA2-1400-000 000	B	1	TRANSISTOR 2SA1576	
Q1610	WA2-1378-000 000	B	1	TRANSISTOR DTC144EU	
Q1611	WA2-1407-000 000	B	1	TRANSISTOR DTC114TU	
Q1612	WA2-1231-000 000	B	1	TRANSISTOR IMH8	
Q1613	WA2-1377-000 000	B	1	TRANSISTOR DTC143EU	
Q1614	WA2-1405-000 000	B	1	TRANSISTOR DTA124EU	
Q1615	WA2-1231-000 000	B	1	TRANSISTOR IMH8	
Q1616	WA2-1099-000 000	B	1	TRANSISTOR FMW1	
Q1617	WA2-1231-000 000	B	1	TRANSISTOR IMH8	
Q1618	WA2-1099-000 000	B	1	TRANSISTOR FMW1	
Q1619	WA2-5051-000 000	B	1	TRANSISTOR DTA144EU	
Q2101	WA2-1337-000 000	B	1	TRANSISTOR 2SC4081	
Q2102	WA2-1234-000 000	B	1	TRANSISTOR IMX2	
Q2103	WA2-1400-000 000	B	1	TRANSISTOR 2SA1576	
Q2104	WA2-1172-000 000	B	1	TRANSISTOR 2SA1461	
Q2105	WA2-0052-000 000	B	1	TRANSISTOR 2SC1621	
Q2106	WA2-0052-000 000	B	1	TRANSISTOR 2SC1621	
Q2107	WA2-1172-000 000	B	1	TRANSISTOR 2SA1461	
Q2109	WA2-1400-000 000	B	1	TRANSISTOR 2SA1576	
Q2110	WA2-1337-000 000	B	1	TRANSISTOR 2SC4081	
Q2201	WA2-1501-000 000	B	1	FET 2SK198	
Q2202	WA2-1337-000 000	B	1	TRANSISTOR 2SC4081	
Q2203	WA2-1234-000 000	B	1	TRANSISTOR IMX2	
Q2204	WA2-1501-000 000	B	1	FET 2SK198	
Q2206	WA2-1400-000 000	B	1	TRANSISTOR 2SA1576	

ELECTRICAL PARTS

	SYMBOL	PART NO.	CLASS	QTY	DESCRIPTION	REMARKS
	Q2207	WA2-1231-000 000	B	1	TRANSISTOR IMH8	
	Q2208	WA2-1337-000 000	B	1	TRANSISTOR 2SC4081	
	Q2209	WA2-1337-000 000	B	1	TRANSISTOR 2SC4081	
	Q2210	WA2-1256-000 000	B	1	TRANSISTOR IMH5	
	Q2211	WA2-1234-000 000	B	1	TRANSISTOR IMX2	
	Q2212	WA2-1400-000 000	B	1	TRANSISTOR 2SA1576	
	Q2213	WA2-1234-000 000	B	1	TRANSISTOR IMX2	
	Q2215	WA2-1231-000 000	B	1	TRANSISTOR IMH8	
	Q2216	WA2-1231-000 000	B	1	TRANSISTOR IMH8	
	Q2217	WA2-1231-000 000	B	1	TRANSISTOR IMH8	
	Q2218	WA2-1232-000 000	B	1	TRANSISTOR IMZ1	
	Q2401	WA2-1234-000 000	B	1	TRANSISTOR IMX2	
	Q2402	WA2-1234-000 000	B	1	TRANSISTOR IMX2	
	Q2403	WA2-1337-000 000	B	1	TRANSISTOR 2SC4081	
	Q2404	WA2-1378-000 000	B	1	TRANSISTOR DTC144EU	
	Q2405	WA2-1378-000 000	B	1	TRANSISTOR DTC144EU	
	Q2406	WA2-1378-000 000	B	1	TRANSISTOR DTC144EU	
	Q2407	WA2-1351-000 000	B	1	TRANSISTOR IMD6	
	Q2408	WA2-1400-000 000	B	1	TRANSISTOR 2SA1576	
	Q2409	WA2-1398-000 000	B	1	TRANSISTOR 2SA1255	
	Q2410	WA2-1381-000 000	B	1	TRANSISTOR 2SC3138	
	Q2411	WA2-1337-000 000	B	1	TRANSISTOR 2SC4081	
	Q2901	WA2-0839-000 000	B	1	TRANSISTOR 2SA1226	
	Q2902	WA2-0393-000 201	B	1	TRANSISTOR 2SA1162 (G.R)	
	Q2903	WA2-0393-000 201	B	1	TRANSISTOR 2SA1162 (G.R)	
⚠	Q2904	WA2-5151-000 000	B	1	TRANSISTOR 2SD968A-S	
	Q2931	WA2-0797-000 201	B	1	TRANSISTOR 2SA1213	
⚠	RR201	DH4-0142-000 000	D	1	LINK, IC ICP-F15	
⚠	RR801	DH4-0144-000 000	D	1	LINK, IC ICP-F25	
⚠	RR1601	DH4-0144-000 000	D	1	LINK, IC ICP-F25	
⚠	RR1602	DH4-0144-000 000	D	1	LINK, IC ICP-F25	
⚠	RR1951	DH4-0166-000 000	D	1	LINK, IC D2000	
⚠	RR1952	DH4-0166-000 000	D	1	LINK, IC D2000	
⚠	RR2901	DH4-0141-000 000	D	1	LINK, IC ICP-N15	
	RU2941	DH9-0489-000 000	C	1	REMOCON MODULE	
	T2401	DH6-0258-000 000	C	1	TRANSFORMER	
⚠	T2901	DH9-0513-000 000	D	1	FLYBACK TRANSFORMER	
	TH2901	WA8-0195-000 000	C	1	THERMISTER	
	VC201	VC6-0340-300 000	C	1	CAPACITOR, TRIMMER 30pF	
	VC2101	VC6-0340-100 000	C	1	CAPACITOR, TRIMMER 10pF	
	VC2102	VC6-0340-100 000	C	1	CAPACITOR, TRIMMER 10pF	
	VC2401	VC6-0340-300 000	C	1	CAPACITOR, TRIMMER 30pF	
	VL301	DH6-0348-000 000	C	1	INDUCTOR, VARIABLE	
	VOL1301	VR9-5031-000 000	C	1	RESISTOR, VARIABLE 5KΩ	
	VR051	VR9-5032-000 000	C	1	RESISTOR, VARIABLE 1.5KΩ	
	VR101	VR5-7780-223 000	C	1	RESISTOR, VARIABLE 22KΩ	
	VR102	VR5-7780-473 000	C	1	RESISTOR, VARIABLE 47KΩ	
	VR202	VR5-7780-473 000	C	1	RESISTOR, VARIABLE 47KΩ	
	VR203	VR5-7780-473 000	C	1	RESISTOR, VARIABLE 47KΩ	
	VR204	VR5-7780-223 000	C	1	RESISTOR, VARIABLE 22KΩ	
	VR206	VR5-7780-472 000	C	1	RESISTOR, VARIABLE 4.7KΩ	
	VR207	VR5-7780-472 000	C	1	RESISTOR, VARIABLE 4.7KΩ	
	VR208	VR5-7780-472 000	C	1	RESISTOR, VARIABLE 4.7KΩ	
	VR210	VR5-7780-102 000	C	1	RESISTOR, VARIABLE 1KΩ	
	VR302	VR5-7780-332 000	C	1	RESISTOR, VARIABLE 3.3KΩ	
	VR303	VR5-7780-473 000	C	1	RESISTOR, VARIABLE 47KΩ	
	VR304	VR5-7780-222 000	C	1	RESISTOR, VARIABLE 2.2KΩ	
	VR305	VR5-7780-222 000	C	1	RESISTOR, VARIABLE 2.2KΩ	
	VR306	VR5-7780-471 000	C	1	RESISTOR, VARIABLE 470Ω	
	VR308	VR5-7780-471 000	C	1	RESISTOR, VARIABLE 470Ω	

ELECTRICAL PARTS

SYMBOL	PART NO.	CLASS	QTY	DESCRIPTION	REMARKS
VR309	VR5-7780-471 000	C	1	RESISTOR, VARIABLE 470Ω	
VR310	VR5-7780-471 000	C	1	RESISTOR, VARIABLE 470Ω	
VR1502	VR5-7780-222 000	C	1	RESISTOR, VARIABLE 2.2KΩ	
VR1503	VR5-7780-221 000	C	1	RESISTOR, VARIABLE 220Ω	
VR1504	VR5-7780-332 000	C	1	RESISTOR, VARIABLE 3.3KΩ	
VR1601	VR5-7780-103 000	C	1	RESISTOR, VARIABLE 10KΩ	
VR2101	VR5-7780-473 000	C	1	RESISTOR, VARIABLE 47KΩ	
VR2102	VR5-7780-473 000	C	1	RESISTOR, VARIABLE 47KΩ	
VR2201	VR5-7780-223 000	C	1	RESISTOR, VARIABLE 22KΩ	
VR2202	VR5-7780-223 000	C	1	RESISTOR, VARIABLE 22KΩ	
VR2203	VR5-7780-472 000	C	1	RESISTOR, VARIABLE 4.7KΩ	
VR2204	VR5-7780-223 000	C	1	RESISTOR, VARIABLE 22KΩ	
VR2205	VR5-7780-223 000	C	1	RESISTOR, VARIABLE 22KΩ	
VR2206	VR5-7780-223 000	C	1	RESISTOR, VARIABLE 22KΩ	
VR2207	VR5-7780-223 000	C	1	RESISTOR, VARIABLE 22KΩ	
VR2208	VR5-7780-223 000	C	1	RESISTOR, VARIABLE 22KΩ	
VR2209	VR5-7780-223 000	C	1	RESISTOR, VARIABLE 22KΩ	
VR2210	VR5-7780-223 000	C	1	RESISTOR, VARIABLE 22KΩ	
VR2211	VR5-7780-223 000	C	1	RESISTOR, VARIABLE 22KΩ	
VR2212	VR5-7780-223 000	C	1	RESISTOR, VARIABLE 22KΩ	
VR2213	VR5-7780-223 000	C	1	RESISTOR, VARIABLE 22KΩ	
VR2214	VR5-7780-104 000	C	1	RESISTOR, VARIABLE 100KΩ	
VR2215	VR5-7780-104 000	C	1	RESISTOR, VARIABLE 100KΩ	
VR2216	VR5-7780-104 000	C	1	RESISTOR, VARIABLE 100KΩ	
VR2401	VR5-7780-103 000	C	1	RESISTOR, VARIABLE 10KΩ	
VR2402	VR5-7780-223 000	C	1	RESISTOR, VARIABLE 22KΩ	
VR2901	VR5-7680-201 000	C	1	RESISTOR, VARIABLE 200Ω	
VR2902	VR5-7680-503 000	C	1	RESISTOR, VARIABLE 50KΩ	
⚠ VR2903	VR7-0380-205 000	C	1	RESISTOR, VARIABLE 2MΩ/200V	
⚠ VR2904	VR7-0710-504 000	C	1	RESISTOR, VARIABLE 500KΩ/100V	

PARTS LIST

PAGE	PART NO.	CLASS	QTY	DESCRIPTION	REMARKS
14	CA4-4292-000 000	C	1	RING	
6	DA1-1677-000 000	B	1	PLATE, COVER	
6	DA1-1864-000 000	B	1	RING, RUBBER	
2	DA1-2190-000 000	C	1	KNOB, EDIT	
2	DA1-2211-000 000	C	1	SHAFT	
2	DA1-2214-000 000	C	1	HOLDER, JACK	
2	DA1-2221-000 000	C	1	SPRING, PLATE	
2	DA1-2235-000 000	B	1	HOOD, LENS	
2	DA1-2486-000 000	B	1	SHOE, ACCESSORY	
2	DA1-2489-000 000	B	1	SHEET, ACCESSORY SHOE	
2	DA1-3590-000 000	A	2	SEAL	
6	DA1-3751-000 000	C	1	HOLDER (1), RECORDER	
6	DA1-3752-000 000	C	1	HOLDER (2), RECORDER	
6	DA1-3754-000 000	C	1	HOLDER (4), RECORDER	
6	DA1-3755-000 000	F	3	SCREW, CROSS-RECESS	
6	DA1-3756-000 000	C	1	PLATE, GROUND	
6	DA1-3762-000 000	C	1	TERMINAL (1), LITHIUM BATTERY	
6	DA1-3763-000 000	C	1	TERMINAL (2), LITHIUM BATTERY	
6	DA1-3764-000 000	C	1	HOLDER, C.B.A.	
6	DA1-3765-000 000	C	3	MECHA. DAMPER	
2	DA1-3767-000 000	B	1	VOLUME KNOB, HEADPHONE	
4	DA1-3791-000 000	C	1	HOLDER (1), CAMERA	
4	DA1-3792-000 000	C	1	HOLDER (2), CAMERA	
4	DA1-3802-000 000	C	1	HOOK, BATTERY LOCK (A)	
4	DA1-3803-000 000	C	1	HOOK, BATTERY LOCK (B)	
4	DA1-3804-000 000	C	1	PLATE, UNLOCK	
4	DA1-3805-000 000	C	2	TERMINAL, BATTERY	
4	DA1-3806-000 000	C	1	HOOK, BATTERY LOCK (C)	
2	DA1-3807-000 000	B	1	SEAL	
4	DA1-3808-000 000	C	1	SCREW, CROSS-RECESS	
2	DA1-3815-000 000	B	1	KNOB, EJECT	
2	DA1-3826-000 000	C	1	COVER, JACK	A2HiE ONLY
2	DA1-3827-000 000	C	1	COVER, JACK	A2HiF ONLY
6	DA1-3857-000 000	B	1	SLIDE SWITCH, E.V.F.	
2	DA1-3884-000 000	C	1	HOLDER, GRIP COVER (A)	
2	DA1-3885-000 000	B	1	COVER (A), GRIP	
2	DA1-3886-000 000	C	1	SHAFT	
2	DA1-3887-000 000	C	1	COVER, LITHIUM BATTERY	
2	DA1-3905-000 000	B	1	KNOB, AUDIO VOLUME (L)	
2	DA1-3906-000 000	B	1	KNOB, AUDIO VOLUME (R)	
2	DA1-3908-000 000	C	1	SHEET, ATTENATOR	
2	DA1-3911-000 000	B	1	KNOB, BATTERY	
2	DA1-3918-000 000	B	1	STRAP, HAND	
2	DA1-3919-000 000	B	1	COVER (B), GRIP	
4	DA7-1697-000 000	C	1	RING, RUBBER	
14	DA7-1769-000 000	C	1	CAP, LNES	
14	DA7-1770-000 000	C	1	CAP, DUST	
4	DA7-2134-000 000	C	1	RING, STOPPER	
4	DA7-2146-000 000	F	1	SCREW	
14	DA8-0188-000 000	C	1	SHOE	
14	DA8-0194-000 000	B	1	KNOB	
14	DA8-0195-000 000	C	2	SLIDE SWITCH	
14	DA8-0199-000 000	B	1	WIND SCREEN	
2	DF1-0464-000 000	B	1	CAP, LENS	
6	DF1-0541-000 000	C	1	PRINTED CORD ASS'Y	
4	DF1-0776-000 000	C	1	PLATE, LOCK	
6	DF1-0778-000 000	C	1	PRINTED CORD ASS'Y	
2	DF1-0781-000 000	B	1	COVER, WHITE BALANCE SENSOR	
2	DF1-0787-000 000	B	1	COVER, CASSETTE	A2HiE ONLY
2	DF1-0788-000 000	B	1	COVER, CASSETTE	A2HiF ONLY

PARTS LIST

	PAGE	PART NO.	CLASS	QTY	DESCRIPTION	REMARKS
	6	DF1-0789-000 000	C	1	HOLDER (3), RECORDER	
	6	DG1-1182-000 000	C	1	TERMINAL C.B.A.	
	6	DG1-1185-000 000	C	1	CONTROL JACK C.B.A.	
	4	DG1-1191-000 000	C	1	WHITE BALANCE SENSOR	
	4	DG1-1193-000 000	C	1	CAMERA KEY C.B.A.	
	2	DG1-1196-000 000	B	1	ZOOM SWITCH (2)	
	6	DG1-1198-000 000	C	1	AUDIO (2) C.B.A.	
	2	DG1-1200-000 000	C	1	MIC JACK C.B.A.	
	6	DG1-1201-000 000	C	1	RECORDER KEY (3) C.B.A.	
	2	DG1-1204-000 000	B	1	LEFT COVER ASS'Y	
	2	DG1-1209-000 000	C	1	HEADPHONE C.B.A.	
	6	DG1-1210-000 000	C	1	VIDEO C.B.A.	
	6	DG1-1211-000 000	C	1	SYSCON SERVO C.B.A.	
	6	DG1-1212-000 000	C	1	VIDEO SUB C.B.A.	
	6	DG1-1213-000 000	C	1	AUDIO (1) C.B.A.	
	4	DG1-1214-000 000	C	1	FUSE BATTERY C.B.A.	
	6	DG1-1215-000 000	C	1	RECORDER KEY (1) C.B.A.	A2HiE ONLY
	4	DG1-1373-000 000	C	1	PROCESS C.B.A.	
	4	DG1-1374-000 000	C	1	AF-KEY C.B.A.	
	6	DG1-1378-000 000	C	1	RECORDER KEY (2) C.B.A.	
	4	DG1-1555-000 000	C	1	BATTERY CASE ASS'Y	
	2	DG1-1560-000 000	B	1	RIGHT COVER ASS'Y	A2HiE ONLY
	2	DG1-1562-000 000	B	1	COVER, REAR	A2HiE ONLY
	2	DG1-1565-000 000	B	1	RIGHT COVER ASS'Y	A2HiF ONLY
	2	DG1-1567-000 000	B	1	COVER, REAR	A2HiF ONLY
	4	DG9-3300-000 000	C	1	RELAY LENS ASS'Y	
	4	DG9-3406-000 000	C	1	ZOOM RING ASS'Y	
	14	DH2-1072-000 000	C	1	CORD ASS'Y	
	6	DH2-1250-000 000	C	1	CONNECTOR 11P	
	6	DH2-1301-000 000	C	1	PRINTED CORD	
	6	DH2-1303-000 000	C	1	PRINTED CORD	
	6	DH2-1304-000 000	C	1	PRINTED CORD	
	6	DH2-1305-000 000	C	1	PRINTED CORD	
	6	DH2-1307-000 000	C	1	PRINTED CORD	
	6	DH2-1308-000 000	C	1	PRINTED CORD	
	6	DH2-1309-000 000	C	1	PRINTED CORD	
	4	DH2-1310-000 000	C	1	PRINTED CORD	
	6	DH2-1311-000 000	C	1	PRINTED CORD	
	4	DH2-1312-000 000	C	1	PRINTED CORD	
	6	DH2-1318-000 000	C	1	PRINTED CORD	
	4	DH2-1336-000 000	C	1	PRINTED CORD	
	6	DH2-1337-000 000	C	1	PRINTED CORD	
	4	DH3-0017-000 000	C	1	DC/DC CONVERTER	
⚠		DH4-0141-000 000	D	1	LINK, IC ICP-N15	
⚠		DH4-0142-000 000	D	1	LINK, IC ICP-F15	
⚠		DH4-0144-000 000	D	3	LINK, IC ICP-F25	
		DH4-0155-000 000	B	1	IC μPD6145G-101	
⚠		DH4-0166-000 000	D	2	LINK, IC D2000	
		DH4-0205-000 000	B	4	IC LVC556F-2	
		DH4-0213-000 000	B	1	IC μPD7564G-533	
		DH4-0236-000 000	B	1	IC MM1019	
		DH4-0257-000 000	B	1	IC μPD75312GF-035	
		DH4-0263-000 000	B	1	IC CXA1207R	
		DH4-0264-000 000	B	1	IC CXA1208R	
	4	DH4-0272-000 000	C	1	MATRIX C.B.A.	
		DH4-0278-000 000	B	1	IC ZA4010	
		DH4-0280-000 000	B	1	IC CM7056	
		DH4-0281-000 000	B	1	IC LD5077	
		DH4-0297-000 000	B	2	IC CXL1506M	
		DH4-0298-000 000	B	1	IC MM1029AFF	

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	PAGE	PART NO.	CLASS	QTY	DESCRIPTION	REMARKS
	6	DH4-0301-000 000	C	1	JOG C.B.A.	
		DH4-0302-000 000	B	1	IC µPD75116GF-739	
		DH4-0303-000 000	B	1	IC CXP80116-563Q	
		DH4-0310-000 000	B	1	IC M37450M4-480FP	
		DH4-0311-000 000	B	1	IC M37450M4-481FP	
		DH4-0318-000 000	B	1	IC CXA1127AM	
		DH4-0321-000 000	B	1	IC CXD1172AM	
		DH4-0325-000 000	B	1	IC CF38403PJ	
		DH4-0326-000 000	B	1	IC CF78125PJ	
		DH4-0327-000 000	B	1	IC CXD1171M	
	4	DH4-0333-000 000	C	1	ENCODER C.B.A.	
		DH4-0362-000 000	B	1	IC µPD6144AG-604	
		DH6-0258-000 000	C	1	TRANSFORMER	
		DH6-0348-000 000	C	1	INDUCTOR, VARIABLE	
		DH9-0405-000 000	C	1	COIL, FERRITE 2µH	
		DH9-0489-000 000	C	1	REMOCON MODULE	
	2	DH9-0497-000 000	C	1	MICROPHONE	
⚠		DH9-0512-000 000	D	1	COIL 210µH	
⚠		DH9-0513-000 000	D	1	FLYBACK TRANSORMER	
	4	DS1-5231-000 000	C	1	SPRING, COIL	
	4	DS1-5232-000 000	C	1	SPRING, COIL	
	2	DS1-6067-000 000	C	1	SPRING, COIL	
	4	DS1-6074-000 000	C	1	SPRING, COIL	
	4	DY1-7125-000 000	C	1	FOCUS RING ASS'Y	
	4	DY1-7127-000 000	C	1	FRONT LENS ASS'Y	
	4	DY1-7137-000 000	B	1	ZOOM LENS ASS'Y	
	4	DY2-1223-000 000	B	1	SPORTS FINDER SF-200	
	2	DY2-1283-000 000	B	1	ZOOM SWITCH (1)	
	6	DY2-1288-000 000	B	1	TOP COVER, E.V.F.	
	6	DY2-1289-000 000	B	1	BOTTOM COVER, E.V.F.	
	6	DY2-1291-000 000	C	1	CRT ASS'Y	
	6	DY2-1293-000 000	C	1	LCD ASS'Y	
	4	DY2-1315-000 000	C	1	ACTUATOR ASS'Y	
	6	DY2-1316-000 000	C	1	E.V.F. C.B.A.	
	6	DY2-1317-000 000	C	1	RECORDER KEY (1) C.B.A.	
	2	DY2-1318-000 000	B	1	TOP COVER ASS'Y	A2HiE ONLY
	2	DY2-1319-000 000	B	1	TOP COVER ASS'Y	A2HiF ONLY
	14	DY2-6018-000 000	B	1	WIRELESS REMOTE CONTROLLER WL-100	A2HiE ONLY
	14	DY2-6020-000 000	B	1	WIRELESS REMOTE CONTROLLER WL-100	A2HiF ONLY
	14	DY3-4197-000 000	B	1	COVER, BATTERY	
	10,12	DY4-2440-000 000	F	3	WASHER	
	12	DY4-2527-000 000	F	1	WASHER	
	12	DY4-2648-000 000	C	1	COASTER, LEFT	
	12	DY4-2649-000 000	C	1	COASTER, RIGHT	
	12	DY4-2650-000 000	C	1	GEAR ASS'Y	
	12	DY4-2656-000 000	C	1	GEAR, JOINT	
	12	DY4-2659-000 000	C	1	BRAKE, TS	
	10	DY4-2660-000 000	C	1	BAND, TENSION	
	12	DY4-2662-000 000	C	1	ROLLER, GUIDE	
	10	DY4-2663-000 000	C	1	REEL, SUPPLY	
	10	DY4-2664-000 000	C	1	ARM, TG7	
	12	DY4-2665-000 000	C	1	ARM, PINCH SUB	
	10	DY4-2666-000 000	C	1	REEL, TAKE UP	
	10	DY4-2669-000 000	C	1	ARM	
	12	DY4-2671-000 000	C	1	PULLEY, RELAY A	
	12	DY4-2672-000 000	C	1	PLATE, SS	
	8	DY4-2673-000 000	C	1	CASSETTE COMPARTMENT ASS'Y	
	12	DY4-2674-000 000	C	1	ROLLER, GUIDE	
	8	DY4-2675-000 000	C	1	TERMINAL, EARTH	
	10	DY4-2676-000 000	C	1	SWITCH	

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PAGE	PART NO.	CLASS	QTY	DESCRIPTION	REMARKS
10	DY4-2678-000 000	C	1	SWITCH, PUSH	
10	DY4-2679-000 000	C	1	FLEXIBLE P.C.B. (1)	
10	DY4-2680-000 000	C	1	FLEXIBLE P.C.B. (2)	
10,12	DY4-2681-000 000	F	4	WASHER	
12	DY4-2684-000 000	C	1	PLATE, TT	
12	DY4-2685-000 000	C	2	SPRING, LEAF	
12	DY4-2686-000 000	F	2	SCREW, CROSS-RECESS	
10,12	DY4-2688-000 000	F	6	WASHER	
12	DY4-2689-000 000	F	2	SCREW, CROSS-RECESS	
10	DY4-2690-000 000	C	1	PLATE, TL	
10	DY4-2691-000 000	C	1	BRAKE, LB	
10	DY4-2692-000 000	C	1	LEVER, LB	
12	DY4-2693-000 000	C	1	ARM, RELEASE	
12	DY4-2694-000 000	C	1	GEAR, UL	
12	DY4-2695-000 000	C	1	ARM, UL	
10	DY4-2696-000 000	C	4	PIN, SHAFT	
10	DY4-2697-000 000	C	1	SPRING, COIL	
12	DY4-2698-000 000	C	1	SPRING, COIL	
10	DY4-2699-000 000	C	1	SPRING, COIL	
12	DY4-2700-000 000	C	1	SPRING	
10	DY4-2701-000 000	C	1	FLANGE, TG2	
10	DY4-2702-000 000	C	1	ROLLER, TG2	
10	DY4-2703-000 000	C	1	FLANGE, TG2	
10	DY4-2704-000 000	C	1	SLEEVE, TG2	
10	DY4-2705-000 000	C	1	SPRING, COIL	
12	DY4-2706-000 000	C	1	SPRING, COIL	
10	DY4-2707-000 000	C	1	SPRING, PLATE	
8	DY4-2708-000 000	C	1	SPRING, COIL	
10	DY4-2710-000 000	C	1	HOLDER, LED	
12	DY4-2711-000 000	C	1	LEVER, EJECT	
10	DY4-2712-000 000	C	1	ARM, RELEASE	
10	DY4-2713-000 000	C	1	BRAKE, S	
10	DY4-2714-000 000	C	1	BRAKE, T	
12	DY4-2715-000 000	C	1	BRAKE, UL	
10	DY4-2716-000 000	C	1	ARM, STOPPER	
10	DY4-2717-000 000	C	1	ARM, ADJUST	
12	DY4-2719-000 000	E	1	BELT (S), TIMING	
8	DY4-2720-000 000	C	1	DAMPER, OIL	
8	DY4-2721-000 000	C	1	GUARD, GUIDE	
10	DY4-2722-000 000	C	2	HOLDER, SENSOR	
10	DY4-2723-000 000	C	1	STOPPER, RK	
10	DY4-2724-000 000	C	1	SPRING, COIL	
10	DY4-2725-000 000	C	1	PLATE, SWITCH	
8	DY4-2726-000 000	C	1	CAPSTAN MOTOR	
8,10	DY4-2727-000 000	F	9	SCREW, CROSS-RECESS	
8,10,12	DY4-2728-000 000	F	7	SCREW, CROSS-RECESS	
8	DY4-2729-000 000	C	2	TAPE	
8	DY4-2730-000 000	F	5	SCREW, CROSS-RECESS	
12	DY4-2742-000 000	C	1	GEAR	
12	DY4-2743-000 000	C	1	GEAR	
8	DY4-2910-000 000	C	1	ROLLER ASS'Y	
8	DY4-2911-000 000	C	1	LODING MOTOR ASS'Y	
10	DY4-2912-000 000	C	1	ARM, PINCH	
10	DY4-2914-000 000	C	1	STOPPER	
12	DY4-2915-000 000	C	1	GEAR, RC	
10	DY4-2917-000 000	C	1	LEVER, SWITCH	
12	DY4-2918-000 000	C	1	GEAR, RK	
12	DY4-2919-000 000	C	1	WORM ASS'Y	
8	DY4-2920-000 000	C	1	CONNECTOR 13P	
10	DY4-2921-000 000	C	1	SWITCH, SLIDE	

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	PAGE	PART NO.	CLASS	QTY	DESCRIPTION	REMARKS
	12	DY4-2922-000 000	C	1	PULLY, RELAY B	
	12	DY4-2923-000 000	C	1	BELT (L), TIMING	
	12	DY4-2924-000 000	C	1	GEAR, WHEEL	
	8	DY4-2925-000 000	C	1	HOLDER	
	8	DY4-2936-000 000	E	1	DRUM ASS'Y	
	8	DY4-2937-000 000	E	1	UPPER DRUM ASS'Y	
	8	DY4-2938-000 000	C	1	HEAD AMP ASS'Y	
		VC6-0340-100 000	C	2	CAPACITOR, TRIMMER 10pF	
		VC6-0340-300 000	C	2	CAPACITOR, TRIMMER 30pF	
⚠		VC6-4130-106 000	D	1	CAPACITOR, ELEC. 10μF/16V	
⚠		VC7-1360-102 000	D	1	CAPACITOR, CERA 1000pF/1KV	
⚠		VC7-1380-152 000	D	1	CAPACITOR, CERA 1500pF/500V	
		VR5-7680-201 000	C	1	RESISTOR, VARIABLE 200Ω	
		VR5-7680-503 000	C	1	RESISTOR, VARIABLE 50KΩ	
		VR5-7780-102 000	C	1	RESISTOR, VARIABLE 1KΩ	
		VR5-7780-103 000	C	2	RESISTOR, VARIABLE 10KΩ	
		VR5-7780-104 000	B	3	RESISTOR, VARIABLE 100KΩ	
		VR5-7780-221 000	C	1	RESISTOR, VARIABLE 220Ω	
		VR5-7780-222 000	C	3	RESISTOR, VARIABLE 2.2KΩ	
		VR5-7780-223 000	C	15	RESISTOR, VARIABEL 22KΩ	
		VR5-7780-332 000	C	2	RESISTOR, VARIABLE 3.3KΩ	
		VR5-7780-471 000	C	4	RESISTOR, VARIABLE 470Ω	
		VR5-7780-472 000	C	4	RESISTOR, VARIABLE 4.7KΩ	
		VR5-7780-473 000	C	6	RESISTOR, VARIABLE 47KΩ	
⚠		VR7-0380-205 000	C	1	RESISTOR, VARIABLE 2MΩ/200V	
⚠		VR7-0710-504 000	C	1	RESISTOR, VARIABLE 500KΩ/100V	
		VR9-5031-000 000	C	1	RESISTOR, VARIABLE 5KΩ	
		VR9-5032-000 000	C	1	RESISTOR, VARIABLE 1.5KΩ	
		VS1-0331-002 000	C	1	CONNECTOR 2P	
		VS1-0876-011 000	C	1	CONNECTOR 11P	
		VS1-0876-013 000	C	1	CONNECTOR 13P	
		VS1-0878-002 000	C	1	CONNECTOR 2P	
		VS1-1021-008 000	C	1	CONNECTOR 8P	
		VS1-1169-005 000	C	1	CONNECTOR 5P	
		VS1-1169-006 000	C	2	CONNECTOR 6P	
		VS1-1169-010 000	C	1	CONNECTOR 10P	
		VS1-1169-015 000	C	1	CONNECTOR 15P	
		VS1-1169-020 000	C	1	CONNECTOR 20P	
		VS1-1169-022 000	C	1	CONNECTOR 22P	
		VS1-1169-026 000	C	1	CONNECTOR 26P	
		VS1-1180-010 000	C	1	CONNECTOR 10P	
		VS1-5051-008 000	C	1	CONNECTOR 8P	
		VS1-5105-010 000	C	1	CONNECTOR 10P	
		VS1-5106-010 000	C	1	CONNECTOR 10P	
		VS1-5127-012 000	C	4	CONNECTOR 12P	
		VS1-5127-016 000	C	6	CONNECTOR 16P	
		VS1-5127-020 000	C	2	CONNECTOR 20P	
		VS1-5127-024 000	C	4	CONNECTOR 24P	
		VS1-5149-008 000	C	3	CONNECTOR 8P	
		WA1-0384-000 000	B	1	ZENER DIODE RD5.6MB2	
		WA1-0953-000 000	B	1	DIODE MA716	
		WA1-0962-000 000	B	7	DIODE MA121	
		WA1-0963-000 000	B	4	ZENER DIODE MA3A100	
		WA1-0989-000 000	B	1	ZENER DIODE MA3100W	
		WA1-1084-000 000	B	24	DIODE MA110	
		WA1-1123-000 000	B	1	DIODE AG01Z	
		WA1-1146-000 000	B	2	DIODE MA707	
		WA1-1149-000 000	B	2	DIODE 1SS250	
		WA1-1152-000 000	B	1	DIODE DA114	
		WA1-1164-000 000	B	1	DIODE DAN202U	

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PAGE	PART NO.	CLASS	QTY	DESCRIPTION	REMARKS
	WA1-1221-000 000	B	1	VARIABLE CAPACITANCE DIODE MA341S	
	WA1-5061-000 000	B	1	DIODE DAP202U	
	WA1-5080-000 000	B	2	DIODE EC10QS03	
	WA1-5122-000 000	B	3	DIODE DAN222	
	WA1-5141-000 000	B	2	DIODE UMN11	
	WA1-5205-000 000	B	1	DIODE DA112	
	WA2-0052-000 000	B	2	TRANSISTOR 2SC1621	
	WA2-0393-000 201	B	2	TRANSISTOR 2SA1162 (G.R)	
	WA2-0797-000 201	B	5	TRANSISTOR 2SA1213	
	WA2-0839-000 000	B	1	TRANSISTOR 2SA1226	
	WA2-1099-000 000	B	2	TRANSISTOR FMW1	
	WA2-1172-000 000	B	2	TRANSISTOR 2SA1461	
	WA2-1198-000 000	B	5	TRANSISTOR IMD2	
	WA2-1228-000 000	B	7	TRANSISTOR IMT2	
	WA2-1230-000 000	B	6	TRANSISTOR IMH6	
	WA2-1231-000 000	B	10	TRANSISTOR IMH8	
	WA2-1232-000 000	B	7	TRANSISTOR IMZ1	
	WA2-1234-000 000	B	17	TRANSISTOR IMX2	
	WA2-1235-000 000	B	1	TRANSISTOR IMB6	
	WA2-1240-000 000	B	1	TRANSISTOR IMT1	
	WA2-1256-000 000	B	3	TRANSISTOR IMH5	
	WA2-1337-000 000	B	23	TRANSISTOR 2SC4081	
	WA2-1351-000 000	B	1	TRANSISTOR IMD6	
	WA2-1377-000 000	B	3	TRANSISTOR DTC143EU	
	WA2-1378-000 000	B	15	TRANSISTOR DTC144EU	
	WA2-1381-000 000	B	1	TRANSISTOR 2SC3138	
	WA2-1398-000 000	B	1	TRANSISTOR 2SA1255	
	WA2-1400-000 000	B	21	TRANSISTOR 2SA1576	
	WA2-1405-000 000	B	3	TRANSISTOR DTA124EU	
	WA2-1406-000 000	B	1	TRANSISTOR DTC124EU	
	WA2-1407-000 000	B	1	TRANSISTOR DTC114TU	
	WA2-1416-000 000	B	1	TRANSISTOR IMB5	
	WA2-1501-000 000	B	2	FET 2SK198	
	WA2-5051-000 000	B	4	TRANSISTOR DTA144EU	
	WA2-5062-000 000	B	1	TRANSISTOR DTC144TU	
	WA2-5088-000 000	B	1	TRANSISTOR DTC114EU	
	WA2-5092-000 000	B	1	TRANSISTOR IMX5	
	WA2-5131-000 000	B	1	TRANSISTOR RU201	
	WA2-5149-000 000	B	2	TRANSISTOR 2SB1412F5	
⚠	WA2-5151-000 000	D	1	TRANSISTOR 2SD968A-S	
	WA2-5152-000 000	B	1	TRANSISTOR 2SB1424	
	WA2-5168-000 000	B	1	FET 2SK879 (Y/GR)	
	WA2-5169-000 000	B	1	FET 2SK880	
	WA2-5267-000 000	B	1	TRANSISTOR IMD1	
	WA3-0974-000 000	B	1	IC TC4011BF	
	WA3-3175-000 000	B	1	IC BU4066BF	
	WA3-3938-000 000	B	1	IC SC14S81F	
	WA3-4264-000 000	B	2	IC SC14S66F	
	WA3-5122-000 000	B	3	IC SC7S32F	
	WA3-5173-000 000	B	4	IC SC7S00F	
	WA3-5201-000 000	B	1	IC MN3106S	
	WA3-5334-000 000	B	1	IC TC74AC04F	
	WA3-5335-000 000	B	1	IC TC74HC4066AF	
	WA3-5392-000 000	B	1	IC S-2917IF	
	WA3-5455-000 000	B	3	IC SC7SU04F	
	WA3-5491-000 000	B	1	IC HD74HC165FP	
	WA3-5548-000 000	B	1	IC TMS4C1050-4DL	
	WA3-5597-000 000	B	1	IC SC7S08F	
	WA4-0458-000 000	B	1	IC NJM3414M	
	WA4-1172-000 000	B	1	IC NJM3415M	

PARTS LIST

PAGE	PART NO.	CLASS	QTY	DESCRIPTION	REMARKS
	WA4-1248-000 000	B	3	IC μPC324G2	
	WA4-1292-000 000	B	1	IC LVA522F-2	
	WA4-1293-000 000	B	1	IC PST529CMT	
	WA4-1322-000 000	B	1	IC AN2514S	
	WA4-1332-000 000	B	1	IC NJM2406F	
	WA4-5042-000 000	B	1	IC CXD1250M	
	WA4-5043-000 000	B	1	IC CXD1255Q	
	WA4-5044-000 000	B	1	IC CXD1159Q	
	WA4-5045-000 000	B	1	IC CXA1337R	
	WA4-5050-000 000	B	1	IC LVA523F	
	WA4-5127-000 000	B	1	IC CXA8006M	
	WA4-5129-000 000	B	2	IC S-87050AF	
	WA4-5141-000 000	B	1	IC MM1036XFF	
	WA4-5161-000 000	B	1	IC CXA1512M	
	WA4-5167-000 000	B	1	IC LB1830M	
	WA4-5213-000 000	B	1	IC RH5RE50A	
	WA8-0195-000 000	C	1	THERMISTER	
	WG1-0417-000 000	B	1	LED SLH-56VT144F	
2,6	XA1-7200-259 000	F	3	SCREW, CROSS-RECESS, PH	
6	XA1-7200-307 000	F	11	SCREW, CROSS-RECESS, PH	
2,6	XA1-7200-509 000	F	3	SCREW, CROSS-RECESS, PH	
4	XA1-7260-609 000	F	1	SCREW, CROSS-RECESS, PH	
4	XA4-3170-507 000	F	2	SCREW, CROSS-RECESS	
4	XA4-4170-509 000	F	1	SCREW, CROSS-RECESS, PH	
4	XA4-4170-609 000	F	2	SCREW, CROSS-RECESS	
4	XA4-8200-509 000	F	2	SCREW, CROSS-RECESS, FCH	
2	XA4-8200-609 000	F	4	SCREW, CROSS-RECESS, FCH	
2	XA4-9200-309 000	F	1	SCREW, CROSS-RECESS, PH	
2,4	XA4-9200-509 000	F	53	SCREW, CROSS-RECESS, PH	
4	XA4-9201-009 000	F	5	SCREW, CROSS-RECESS, PH	
6	XA9-0484-000 000	F	5	SCREW, CROSS-RECESS, FCH	
6,14	XB4-6201-609 000	F	4	SCREW, CROSS-RECESS	
4	XB4-6260-607 000	F	1	SCREW M2.6x6	
4	X91-1736-770 000	F	3	SCREW, CROSS-RECESS, PH	
4	YG9-5058-000 000	C	1	PHOTO REFLECTOR C.B.A.	
4	YG9-5062-000 000	C	1	IG METER	
4	YH7-0013-000 000	C	1	PZ MOTOR ASS'Y	
4	YH7-0023-000 000	C	1	AF MOTOR ASS'Y	
10	Y22-8012-000 000	B	1	LED GL452S	
8	Y22-8120-000 000	B	1	SENSOR, DEW	
10	Y22-8121-000 000	B	2	PHOTO IC SPI-315-25-CD	
10	Y22-8123-000 000	B	2	PHOTO TRANSISTOR EE-P109	

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< Guide to diagrams >

1. Color coding

(1) Single lines in block diagrams

Camera and DSP section
Red (———) : Y
(– – – –) : C
AUTO-FOCUS section
Red (———) : ES/CU

Syscon-servo section
Red (———) : Drum servo signal
(– – – –) : Capstan servo signal
Video section
Red (———) : Recording
(– – – –) : Playback

(2) Voltage on circuit diagram

Red : Recording
Black : Playback

(3) Signal lines in circuit diagrams

Camera section
Red : Power supply line
Blue : Luminance signal
Orange : Chrominance signal
Hatched black (▨): Luminance + Chromiannce signals

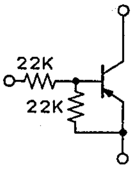
Recorder section
Blue (———) : Capstan + Feed back (ATF, FG)
(– – – –) : Capstan + Drive (PWM)
Orange (———) : Drum + Feed back (FG, PG)
(– – – –) : Drum + Drive (PWM)

Recorder section
Gray (▨) : Recording luminance + Chrominance signals
(▩) : Playback luminance + Chrominance signals
Blue (———) : Recording luminance signal
(– – – –) : Playback luminance signal
(—·—) : Recording Hi8 luminance signal
Orange (———) : Recording chrominance signal
(– – – –) : Playback chrominance signal
Red (———) : Recording audio signal
(– – – –) : Playback audio signal

(4) PC board layout

Orange	Component side
Hatched black (▨)	Soldering side
Black	Parts on component side
Blue	Parts on soldering side
Blue (———)	Signal pattern in power supply layer
Blue (----)	Signal pattern in ground layer

2. Equivalent circuits of digital transistor



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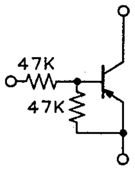

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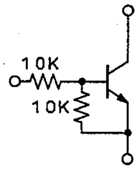

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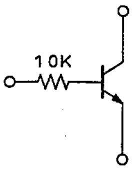

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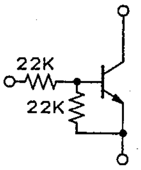

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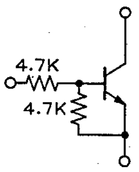

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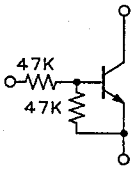

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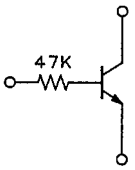

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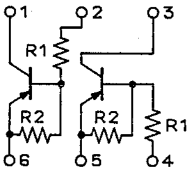
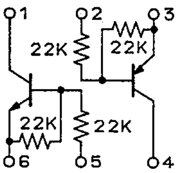
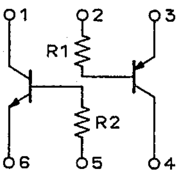
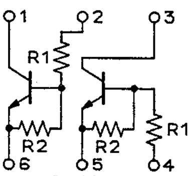
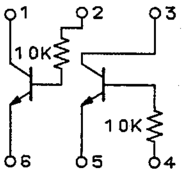
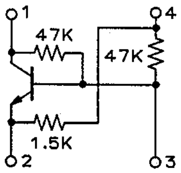

1
2
3
R1
R2
R2
R1
6
5
4
IMB5
R1, R2:22K
IMB6
R1, R2:47K


1
2
3
22K
22K
22K
22K
6
5
4
IMD2


1
2
3
R1
R2
6
5
4
IMD1
R1, R2:22K
IMD6
R1, R2:4.7K


1
2
3
R1
R2
R2
R1
6
5
4
IMH5
R1, R2:22K
IMH6
R1, R2:47K


1
2
3
10K
10K
6
5
4
IMH8


1
4
47K
47K
1.5K
2
3
RU201

3. Indications in circuit diagram

- Resistance is represented in ohms (Ω).
- Capacitance is represented in farads (F).
- Wattage of resistor is 1/16 W unless otherwise specified.
- Voltages are measured with a digital voltmeter.
- Waveform photographs are taken by using a 10:1 probe.
- IC No. in each C.B.A.s are listed on the bottom of diagrams.
- No. colored in blue are corresponded to the No. of waveform photographs.
- Voltage values and waveform photographs in circuit diagram are based on the following condition.

Camera section codnitions
Colorbar, standard angle of view, AWB-preset

Recorder section conditions

EE	Setting 4 for the DSP section Coloarbar standard angle of view (close up)
Recording	Service mode 4, Colorbar (pattern generator) Hi8 tape
Playback	Service mode 4, Self-recording playback tape (Colorbar signal) * Hi8 tape used.

INTERCONNECTION DIAGRAM

PROCESS C.B.A.	
CN2101	
1	V0
2	+15V
3	GND
4	−10V
5	V1
6	GND
7	V SUB
8	V2
9	V3
10	V4
11	H2
12	H1
13	LH1
14	RG
15	+15V
16	GND
17	GND
18	Vss
19	NC
20	Vgg
CN2102	
1	CANERA 5V
2	NC
3	GND
4	+15V
5	GND
6	−10V
7	UNREG 6V
8	CAMERA ON Ⓛ
CN2103	
1	UNREG 6V
2	GND
CN2104	
1	CAMERA ON Ⓛ
2	CAMERA−CS
3	S−DATA
4	S−CLOCK
5	S−DATA
6	GND
7	SLOW TIMING
CN2105	
1	D+
2	C+
3	D−
4	C−
5	OUT (+)
6	IN (−)
7	OUT (−)
8	IN (+)
CN2106	
1	Ys
2	GND
3	Y
4	CAMERA 5V
5	GND
6	IRIS POSITION
7	HD
8	GATE PULSE B
9	GND
10	VD
11	S−CLOCK
12	GND
13	S−DATA
14	GND
15	S−DATA
16	AF−CS
17	KEY IN 1
18	KEY IN 2
19	KEY IN 3
20	KEY IN 4
21	KEY OUT 1
22	KEY OUT 2
23	KEY OUT 3
24	KEY OUT 4
CN2108	
1	WB3
2	WB2
3	WB1
4	CAMERA 5V
5	GND
6	WB−DATA
CN2109	
1	CAMERA (C)
2	GND
3	CAMERA (Y)
4	GND
5	CAMERA (SC)
CN2110	
1	TRIG. SW ON Ⓛ
2	GND (R−KEY 1)
CN2111	
1	A−FADE
2	GND

CAMERA−KEY C.B.A.	
CN2801	
1	DSP SELECT Ⓗ
2	KEY IN 2
3	KEY OUT 1
4	KEY OUT 2
5	KEY OUT 3
6	+3.6V
7	ZOOM SW 1
8	ZOOM SW 2
9	GND
10	AF FRAME
CN2802	
1	ZOOM SW 1
2	GND
3	+3.6V
CN2803	
1	ZOOM SW 2
2	GND
3	+3.6V
CN2804	
1	AF FRAME
2	DSP SELECT Ⓗ

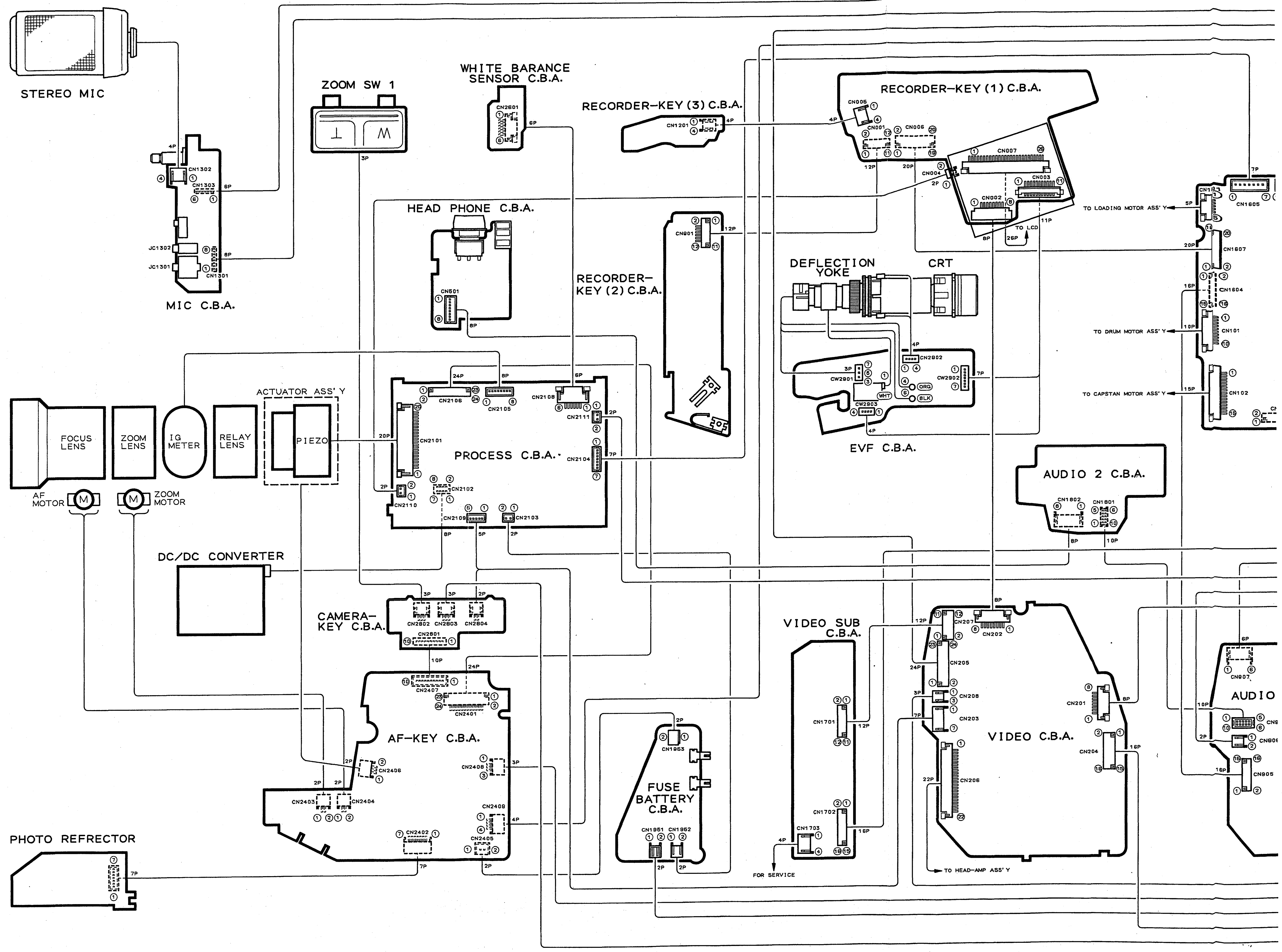
AF KEY C.B.A.	
CN2401	
1	KEY OUT 4
2	KEY OUT 3
3	KEY OUT 2
4	KEY OUT 1
5	KEY IN 4
6	KEY IN 3
7	KEY IN 2
8	KEY IN 1
9	AF−CS
10	S−DATA
11	GND
12	S−DATA
13	GND
14	S−CLOCK
15	VD
16	GND
17	GATE PULSE B
18	HD
19	IRIS POSITION
20	GND
21	CAMERA 5V
22	Y
23	GND
24	Ys .
CN2402	
1	ZOOM 0
2	ZOOM 1
3	LED CONT.
4	ZOOM 2
5	CAMERA 5V
6	FOCUS 0
7	FOCUS 1
CN2403	
1	WIDE Ⓗ
2	TELE Ⓗ
CN2404	
1	AF NEAR
2	AF FAR
CN2405	
1	UNREG 6V
2	GND
CN2406	
1	PIEZO
2	GND
CN2407	
1	DSP SELECT Ⓗ
2	KEY IN 2
3	KEY OUT 1
4	KEY OUT 2
5	KEY OUT 3
6	+3.6V
7	ZOOM SW 1
8	ZOOM SW 2
9	GND
10	AF FRAME
CN2408	
1	KEY OUT 2
2	KEY OUT 1
3	KEY IN 1
CN2409	
1	EVER 5V
2	DSP KEY 0
3	DSP KEY 1
4	GND

MIC C.B.A.	
CN1301	
1	GND
2	Lch
3	L−BIAS
4	R−BIAS
5	Rch
6	GND
7	AUDIO 5V
8	ATT SW 20dB Ⓛ
CN1302	
1	GND
2	Lch
3	Rch
4	GND
CN1303	
1	GND
2	Rch (VR OUT)
3	Rch (VR IN)
4	Lch (VR IN)
5	Lch (VR OUT)
6	GND

FUSE BATTERY C.B.A.	
CN1951	
1	UNREG 6V
2	GND
CN1.952	
1	UNREG 6V
2	GND
CN1953	
1	UNREG 6V
2	GND

HEAD−PHONE C.B.A.	
CN051	
1	GND
2	Lch
3	Rch
4	GND
5	A−MUTE Ⓗ
6	AUDIO 5V
7	GND
8	P ON−MUTE

WHITE BALANCE SENSOR C.B.A.	
CN2601	
1	WB−DATA
2	GND
3	CAMERA 5V
4	WB1
5	WB2
6	WB3


STEREO MIC
ZOOM SW 1
T
W
3P
WHITE BARANCE SENSOR C.B.A.
CN2601
6P
RECORDER−KEY (3) C.B.A.
CN1201
4P
RECORDER−KEY (1) C.B.A.
CN005
CN001
CN006
CN007
CN004
CN003
CN002
12P
20P
2P
8P
26P
11P
TO LCD
CN1302
CN1303
6P
8P
JC1302
JC1301
CN1301
MIC C.B.A.
HEAD PHONE C.B.A.
CN501
8P
RECORDER− KEY (2) C.B.A.
CN901
12P
DEFLECTION YOKE
CRT
CW2902
CW2901
CW2903
EVF C.B.A.
4P
3P
7P
WHT
ORG
BLK
TO LOADING MOTOR ASS' Y
TO DRUM MOTOR ASS' Y
TO CAPSTAN MOTOR ASS' Y
CN1605
CN1607
CN1604
CN101
CN102
ACTUATOR ASS' Y
FOCUS LENS
ZOOM LENS
IG METER
RELAY LENS
PIEZO
AF MOTOR
ZOOM MOTOR
M
CN2106
CN2105
CN2108
CN2111
CN2101
CN2104
CN2102
CN2110
CN2109
CN2103
PROCESS C.B.A.
24P
20P
AUDIO 2 C.B.A.
CN1802
CN1801
8P
10P
DC/DC CONVERTER
CAMERA− KEY C.B.A.
CN2802
CN2803
CN2804
CN2801
10P
24P
CN2407
CN2401
AF−KEY C.B.A.
CN2406
CN2408
CN2403
CN2404
CN2409
CN2402
CN2405
7P
PHOTO REFRECTOR
FUSE BATTERY C.B.A.
CN1953
CN1951
CN1952
VIDEO SUB C.B.A.
CN1701
CN1702
CN1703
FOR SERVICE
VIDEO C.B.A.
CN207
CN202
CN205
CN208
CN203
CN206
CN201
CN204
TO HEAD−AMP ASS' Y
AUDIO
CN907
CN906
CN905

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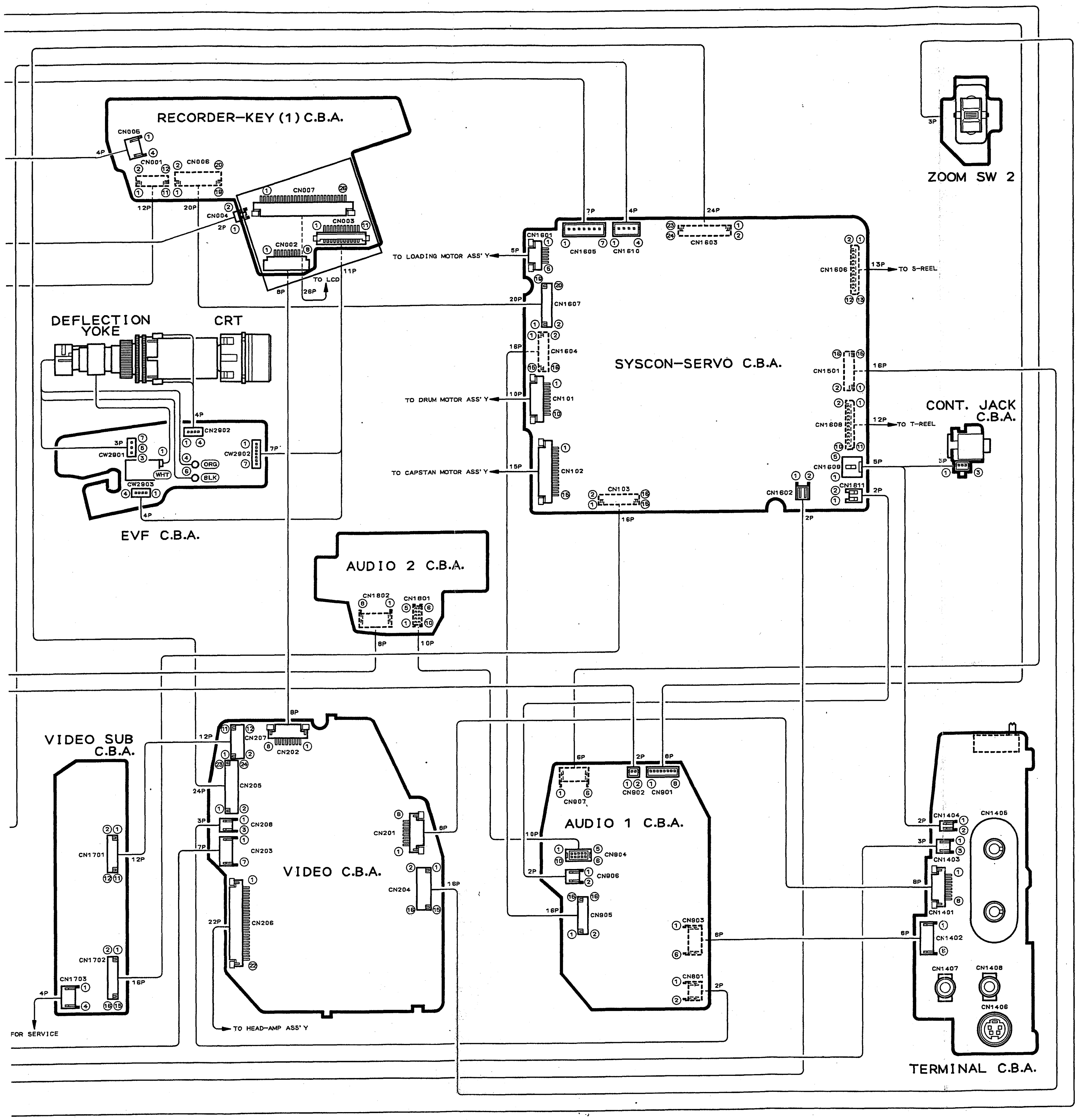
RECORDER-KEY (1) C.B.A.
CN005
CN001
CN006
CN007
CN004
CN003
CN002
4P
12P
20P
2P
8P
26P
11P
TO LCD
ZOOM SW 2
3P
DEFLECTION YOKE
CRT
CW2901
CN2902
CW2902
CW2903
WHT
ORG
BLK
EVF C.B.A.
TO LOADING MOTOR ASS'Y
TO DRUM MOTOR ASS'Y
TO CAPSTAN MOTOR ASS'Y
SYSCON-SERVO C.B.A.
CN1601
CN1605
CN1610
CN1603
CN1607
CN1604
CN101
CN102
CN103
CN1606
CN1501
CN1608
CN1609
CN1611
CN1602
7P
4P
24P
5P
20P
18P
10P
15P
16P
13P
12P
2P
TO S-REEL
TO T-REEL
CONT. JACK C.B.A.
AUDIO 2 C.B.A.
CN1802
CN1801
10P
VIDEO SUB C.B.A.
CN1701
CN1702
CN1703
FOR SERVICE
VIDEO C.B.A.
CN207
CN202
CN205
CN208
CN203
CN206
CN201
CN204
22P
TO HEAD-AMP ASS'Y
AUDIO 1 C.B.A.
CN907
CN802
CN901
CN904
CN906
CN905
CN903
CN801
6P
TERMINAL C.B.A.
CN1404
CN1405
CN1403
CN1401
CN1402
CN1407
CN1408
CN1406

	RECORDER-KEY 1 C.B.A.
CN001	
1	NC
2	NC
3	NC
4	HI8 SW Ⓛ
5	NC
6	TIMER SW Ⓛ
7	– SW Ⓛ
8	+ SW Ⓛ
9	SHIFT SW Ⓛ
10	TITLE/DATE SW Ⓛ
11	LITHIUM 3V
12	GND
CN002	
1	GND
2	VD
3	HD
4	UNREG 6V
5	UNREG 6V
6	AV ON Ⓛ
7	GND
8	EVF VIDEO
CN003	
1	EVF VIDEO
2	GND
3	AV ON Ⓛ
4	UNREG 6V
5	GND
6	HD
7	VD
8	TALLY
9	SS 5V
10	REMOCON DATA
11	GND
CN004	
1	GND
2	TRIG. SW Ⓛ
CN005	
1	POWER SW Ⓛ
2	TRIG. SW Ⓛ
3	GND
4	POWER LED
CN006	
1	NC
2	NC
3	SHIFT Ⓗ /LOAD Ⓛ
4	AUDIO-DATA
5	SHIFT-CLOCK
6	EJECT SW Ⓛ
7	HIMP Ⓗ
8	EVER 5V
9	SAFETY TAB Ⓗ
10	ME Ⓗ /MP Ⓛ
11	KEY-CS
12	S-DATA
13	S-DATA
14	S-CLOCK
15	WAKE UP Ⓛ
16	E5 DET.
17	CG1-CS
18	CG1-STROBE
19	GND
20	SS 5V
CN007	
1	COM3
2	COM2
3	COM1
4	COM0
5	SEG0
6	SEG1
7	SEG2
8	SEG3
9	SEG4
10	SEG5
11	SEG6
12	SEG7
13	SEG8
14	SEG9
15	SEG10
16	SEG11
17	SEG12
18	SEG13
19	SEG14
20	SEG15
21	SEG16
22	SEG17
23	SEG18
24	SEG19
25	SEG20
26	SEG21

	RECORDER-KEY 2 C.B.A.
CN1901	
1	GND
2	LITHIUM 3V
3	TITLE/DATE SW Ⓛ
4	SHIFT SW Ⓛ
5	+ SW Ⓛ
6	– SW Ⓛ
7	TIMER SW Ⓛ
8	NC
9	HI8 SW Ⓛ
10	NC
11	NC
12	NC

	RECORDER-KEY 3 C.B.A.
CN1201	
1	POWER SW Ⓛ
2	TRIG. SW Ⓛ
3	GND
4	POWER LED

	CONT. JACK C.B.A.
CN1251	
1	LANC
2	GND
3	EDIT 6V

	AUDIO 1 C.B.A.
CN901	
1	GND
2	Lch
3	L-BIAS
4	R-BIAS
5	Rch
6	GND
7	AUDIO 5V
8	ATT SW 20dB Ⓛ
CN902	
1	A-FADE
2	GND
CN903	
1	MONO OUT
2	GND
3	Lch OUT
4	GND
5	Rch OUT
6	GND
CN904	
1	GND
2	Lch
3	Rch
4	GND
5	Rch LEVEL
6	Lch LEVEL
7	A-MUTE Ⓗ
8	AUDIO 5V
9	GND
10	P ON-MUTE Ⓗ
CN905	
1	HEAD SW PULSE
2	A-MUTE Ⓗ
3	PB Ⓗ /EE Ⓛ
4	STEREO Ⓗ /MONO. Ⓛ
5	NC
6	AV ON Ⓛ
7	NC
8	SS 5V
9	UNREG 6V
10	NC
11	NC
12	REC LEV. AUTO Ⓗ
13	Lch LEVEL
14	NC
15	Rch LEVEL
16	NC
CN906	
1	UNREG 6V
2	GND
CN907	
1	GND
2	Rch (VR OUT)
3	Rch (VR IN)
4	Lch (VR IN)
5	Lch (VR OUT)
6	GND
CN801	
1	REC AFM
2	GND
3	PB-RF

	AUDIO 2 C.B.A.
CN1801	
1	GND
2	Lch
3	Rch
4	GND
5	Rch LEVEL
6	Lch LEVEL
7	A-MUTE Ⓗ
8	AUDIO 5V
9	GND
10	P ON MUTE Ⓗ
CN1802	
1	GND
2	Lch
3	Rch
4	GND
5	A-MUTE Ⓗ
6	AUDIO 5V
7	GND
8	P ON-MUTE Ⓗ

	VIDEO SUB C.B.A.
CN1701	
1	GND
2	PB-RF
3	ME Ⓗ /MP Ⓛ
4	PB-RF (Y)
5	NORM. Ⓗ /HI8 Ⓛ
6	REC Ⓛ
7	PB-RF (Y EQ)
8	PB 5V
9	COMP. SYNC
10	REC ATF
11	GND
12	VIDEO 5V
CN1702	
1	SEL1
2	SEL2
3	ATF SW
4	ATF LOCK Ⓛ
5	ATF ERROR
6	TS A
7	TS B
8	ATF ADJ. Ⓗ
9	HEAD SW PULSE
10	HI8 DET Ⓗ
11	SP Ⓗ /LP Ⓛ
12	GND
13	GND
14	GND
15	JOG VD
16	NC
CN1703	
1	PB-RF
2	GND
3	HEAD SW PULSE
4	SHIFT

	VIDEO C.B.A.
CN201	
1	Y OUT
2	GND
3	C OUT
4	GND
5	VIDEO OUT
6	VIDEO 5V
7	EDIT SW ON Ⓛ
8	NC
CN202	
1	EVF VIDEO
2	GND
3	AV ON Ⓛ
4	UNREG 6V
5	UNREG 6V
6	HD
7	VD
8	GND
CN203	
1	CAMERA (C)
2	GND
3	CAMERA (Y)
4	GND
5	CAMERA (SC)
6	AF FRAME
7	GND
CN204	
1	Y (DSP OUT)
2	GND
3	NC
4	Y (DSP IN)
5	GND
6	GND
7	C (DSP OUT)
8	GND
9	GND
10	C (DSP IN)
11	ME Ⓗ /MP Ⓛ
12	UNREG 6V
13	UNREG 6V
14	UNREG 6V
15	SC
16	HEAD SW PULSE
CN205	
1	JOG VD
2	CG0·V-DATA
3	CG0·V-CLOCK
4	CG0-STROBE
5	VIDEO-CS
6	ACK Ⓛ
7	V-MUTE Ⓗ
8	COMP. SYNC
9	NC
10	S-DATA
11	S-CLOCK
12	CG1-STROBE
13	DISPLAY Ⓛ
14	NC
15	REC Ⓛ
16	FE ON Ⓛ
17	HI8 Ⓗ /NORM. Ⓛ
18	DSP. SELECT Ⓗ
19	CH-1' H-SW PULSE
20	EDIT SW ON Ⓛ
21	PB Ⓗ /EE Ⓛ
22	JOG Ⓗ
23	SP Ⓗ /LP Ⓛ
24	AV ON Ⓛ
CN206	
1	GND
2	NC
3	GND
4	VIDEO 5V
5	NC
6	NC
7	PB-RF
8	REC-RF
9	NC
10	CH-1' H-SW PULSE
11	REC Ⓛ
12	GND
13	GND
14	NC
15	GND
16	HEAD SW PULSE
17	NC
18	NC
19	ME Ⓗ /MP Ⓛ
20	NC
21	FE ON Ⓛ
22	NC
CN207	
1	VIDEO 5V
2	GND
3	REC ATF
4	COMP. SYNC
5	PB 5V
6	PB-RF (Y EQ)
7	REC Ⓛ
8	NORM. Ⓗ /HI8 Ⓛ
9	PB-RF (Y)
10	ME Ⓗ /MP Ⓛ
11	PB-RF
12	GND
CN208	
1	REC AFM
2	GND
3	PB-RF

	SYSCON-SERVO C.B.A.
CN101	
1	GND
2	D-PG
3	PG-COM
4	D-FG
5	FG-COM
6	GND
7	COM
8	W
9	V
10	U
CN102	
1	GND
2	SS 5V
3	C-FG1
4	C-FG2
5	W
6	U
7	HE–
8	V+
9	V–
10	HE+
11	U+
12	U–
13	V
14	W+
15	W–
CN103	
1	NC
2	JOG VD
3	GND
4	GND
5	GND
6	SP Ⓗ /LP Ⓛ
7	HI8 DET Ⓗ
8	HEAD SW PULSE
9	ATF ADJ. Ⓗ
10	TS B
11	TS A
12	ATF ERROR
13	ATF LOCK Ⓛ
14	ATF SW
15	SEL2
16	SEL1
CN1501	
1	HEAD SW PULSE
2	SC
3	UNREG 6V
4	UNREG 6V
5	UNREG 6V
6	ME Ⓗ /MP Ⓛ
7	C (DSP IN)
8	GND
9	GND
10	C (DSP OUT)
11	GND
12	GND
13	Y (DSP IN)
14	NC
15	GND
16	Y (DSP OUT)
CN1601	
1	SS 5V
2	DEW SENSOR
3	GND
4	UNLOAD Ⓗ
5	LOAD Ⓗ
CN1602	
1	UNREG 6V
2	GND
CN1603	
1	AV ON Ⓛ
2	SP Ⓗ /LP Ⓛ
3	JOG Ⓗ
4	PB Ⓗ /EE Ⓛ
5	EDIT SW ON Ⓛ
6	CH-1' H-SW PULSE
7	DSP SELECT Ⓗ
8	HI8 Ⓗ /NORM. Ⓛ
9	FE ON Ⓛ
10	REC Ⓛ
11	NC
12	DISPLAY Ⓛ
13	CG1-STROBE
14	S-CLOCK
15	S-DATA
16	NC
17	COMP. SYNC
18	V-MUTE Ⓗ
19	ACK
20	VIDEO-CS
21	CG0-STROBE
22	CG0·V-CLOCK
23	CG0·V-DATA
24	JOG VD
CN1604	
1	NC
2	Rch LEVEL
3	NC
4	Lch LEVEL
5	REC REV. AUTO Ⓗ
6	NC
7	NC
8	NC
9	SS 5V
10	NC
11	AV ON Ⓛ
12	NC
13	STEREO Ⓗ /MONO. Ⓛ
14	PB Ⓗ /EE Ⓛ
15	A-MUTE Ⓗ
16	HEAD SW PULSE
CN1605	
1	CAMERA ON Ⓛ
2	CAMERA-CS
3	S-DATA
4	S-CLOCK
5	S-DATA
6	GND
7	SLOW TIMING

	SYSCON-SERVO C.B.A.
CN1606	
1	NC
2	NC
3	NC
4	EOT SENS. Ⓗ
5	SS 5V
6	CASSETTE DOWN Ⓛ
7	GND
8	MODE 1
9	MODE 2
10	MODE 3
11	S-REEL FG
12	SS 5V
13	S-REEL LED (–)
CN1607	
1	SS 5V
2	GND
3	CG1-STROBE
4	CG1-CS
5	E5 DET.
6	WAKE UP Ⓛ
7	S-CLOCK
8	S-DATA
9	S-DATA
10	KEY-CS
11	ME Ⓗ /MP Ⓛ
12	SAFETY TAB Ⓗ
13	EVER 5V
14	HIMP Ⓗ
15	EJECT SW Ⓛ
16	L-CLOCK
17	AUDIO DATA
18	SHIFT Ⓗ /LOAD Ⓗ
19	NC
20	NC
CN1608	
1	T-REEL LED (–)
2	SS 5V
3	T-REEL FG
4	SS 5V
5	BOT SENS. Ⓗ
6	SS 5V
7	TAPE SENS. LED
8	SAFETY TAB Ⓗ
9	HIMP Ⓗ
10	ME Ⓗ /MP Ⓛ
11	GND
CN1609	
1	EJECT SW Ⓛ
2	GND
3	LANC
4	GND
5	EDIT 6V
CN1610	
1	EVER 5V
2	DSP KEY 0
3	DSP KEY 1
4	GND
CN1611	
1	UNREG 6V
2	GND

	EVF C.B.A.
CN2902	
1	H+
2	H–
3	V+
4	V–
CW2901	
1	H
2	G1
3	K
CW2902	
1	EVF VIDEO
2	GND
3	AV ON Ⓛ
4	UNERG 6V
5	GND
6	HD
7	VD
CW2903	
1	TALLY
2	SS 5V
3	REMOCON DATA
4	GND

	TERMINAL C.B.A.
CN1401	
1	S CONNECTED Ⓛ
2	EDIT SW ON Ⓛ
3	VIDEO 5V
4	VIDEO OUT
5	GND
6	C OUT
7	GND
8	Y OUT
CN1402	
1	MONO OUT
2	GND
3	Lch OUT
4	GND
5	Rch OUT
6	GND
CN1403	
1	KEY OUT 2
2	KEY OUT 1
3	KEY IN 1
CN1404	
1	GND
2	EJECT SW Ⓛ

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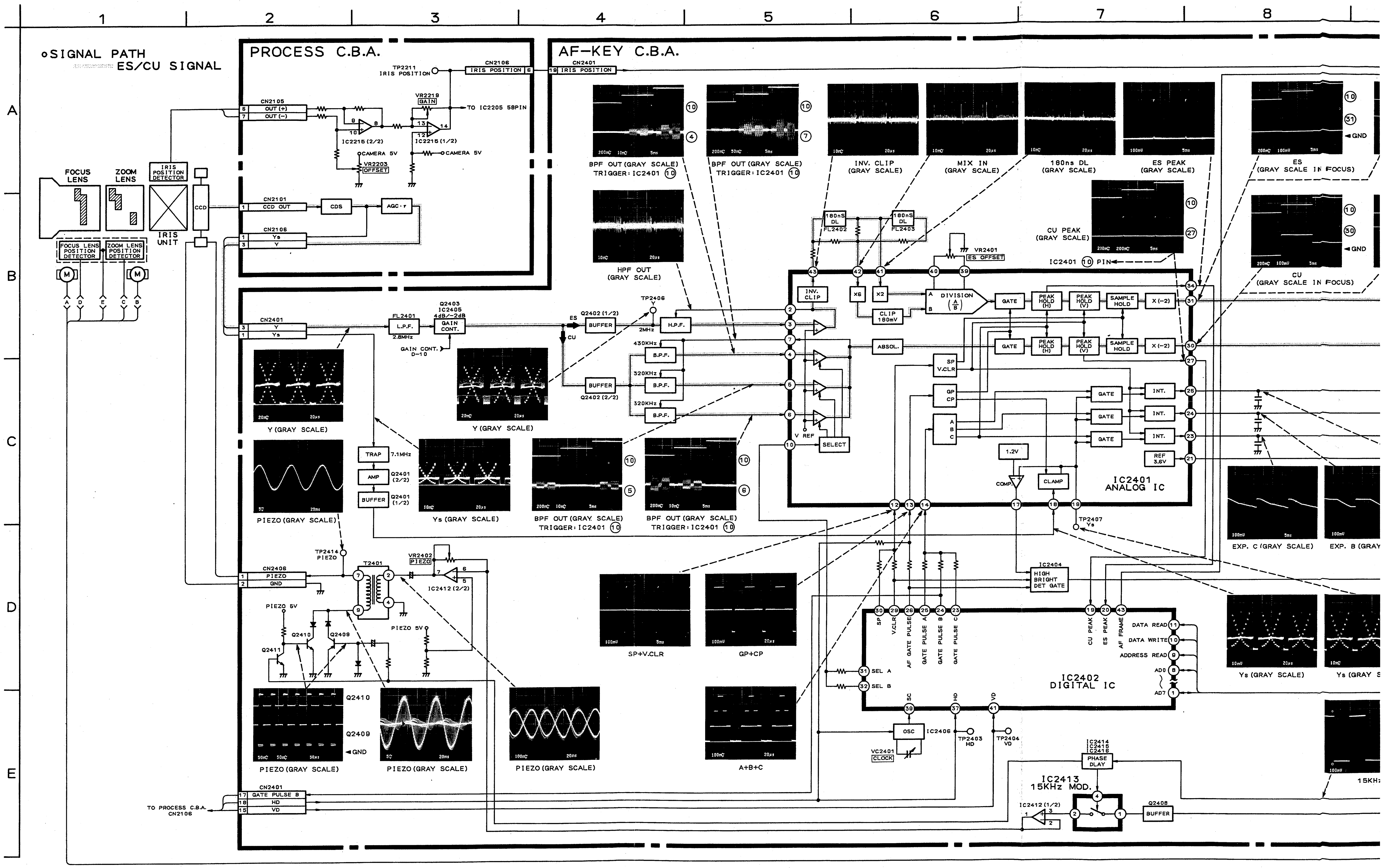
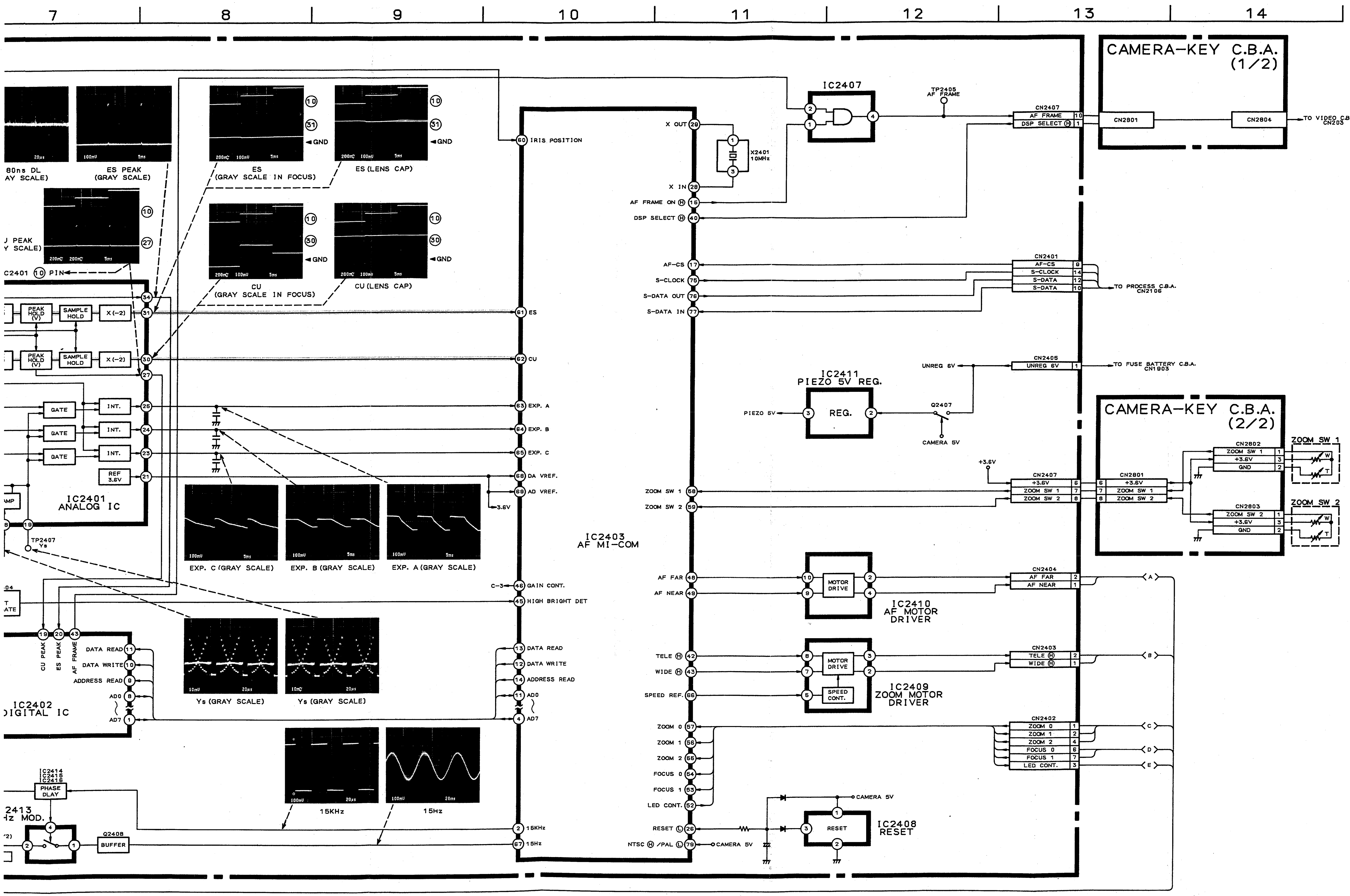
BLOCK DIAGRAM CAMERA SECTION (AF-KEY C.B.A.)



○SIGNAL PATH
ES/CU SIGNAL
PROCESS C.B.A.
AF-KEY C.B.A.
FOCUS LENS
ZOOM LENS
IRIS POSITION DETECTOR
IRIS UNIT
FOCUS LENS POSITION DETECTOR
ZOOM LENS POSITION DETECTOR
CCD
TP2211 IRIS POSITION
CN2106 IRIS POSITION
CN2401 IRIS POSITION
CN2105 OUT (+) OUT (−)
IC2215 (2/2)
IC2215 (1/2)
VR2219 GAIN
TO IC2205 58PIN
CAMERA 5V
VR2203 OFFSET
CN2101 CCD OUT
CDS
AGC·γ
CN2106 Ys Y
CN2401 Y Ys
FL2401 L.P.F. 2.8MHz
Q2403 IC2405 4dB/−2dB GAIN CONT.
GAIN CONT. D-10
ES
CU
Q2402 (1/2) BUFFER
Q2402 (2/2) BUFFER
TP2406 Y
2MHz H.P.F.
430KHz B.P.F.
320KHz B.P.F.
320KHz B.P.F.
TRAP 7.1MHz
AMP Q2401 (2/2)
BUFFER Q2401 (1/2)
Y (GRAY SCALE)
PIEZO (GRAY SCALE)
Ys (GRAY SCALE)
BPF OUT (GRAY SCALE) TRIGGER: IC2401 ⑩
HPF OUT (GRAY SCALE)
INV. CLIP (GRAY SCALE)
MIX IN (GRAY SCALE)
180ns DL (GRAY SCALE)
ES PEAK (GRAY SCALE)
ES (GRAY SCALE IN FOCUS)
CU (GRAY SCALE IN FOCUS)
CU PEAK (GRAY SCALE)
◄GND
180nS DL FL2402
180nS DL FL2403
VR2401 ES OFFSET
IC2401 ⑩ PIN
INV. CLIP
X6
X2
CLIP 180mV
DIVISION (A/B)
GATE
PEAK HOLD (H)
PEAK HOLD (V)
SAMPLE HOLD
X (−2)
ABSOL.
SP V.CLR
GP CP
A B C
INT.
REF 3.6V
1.2V
COMP.
CLAMP
V REF
SELECT
IC2401 ANALOG IC
TP2407 Ys
EXP. C (GRAY SCALE)
EXP. B (GRAY
SP+V.CLR
GP+CP
A+B+C
IC2404 HIGH BRIGHT DET GATE
SP
V.CLR
AF GATE PULSE
GATE PULSE A
GATE PULSE B
GATE PULSE C
CU PEAK
ES PEAK
AF FRAME
DATA READ
DATA WRITE
ADDRESS READ
AD0
AD7
SEL A
SEL B
IC2402 DIGITAL IC
SC
HD
VD
OSC IC2406
VC2401 CLOCK
TP2403 HD
TP2404 VD
IC2414 IC2415 IC2416 PHASE DLAY
IC2413 15KHz MOD.
IC2412 (1/2)
Q2408 BUFFER
Ys (GRAY SCALE)
Ys (GRAY S
15KH
CN2406 PIEZO GND
TP2414 PIEZO
T2401
VR2402 PIEZO
IC2412 (2/2)
PIEZO 5V
Q2410
Q2409
Q2411
◄GND
CN2401 GATE PULSE B HD VD
TO PROCESS C.B.A. CN2106


7
8
9
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11
12
13
14
80ns DL
AY SCALE)
ES PEAK
(GRAY SCALE)
ES
(GRAY SCALE IN FOCUS)
ES (LENS CAP)
CU
(GRAY SCALE IN FOCUS)
CU (LENS CAP)
U PEAK
Y SCALE)
C2401 ⑩ PIN
◄GND
PEAK HOLD (V)
SAMPLE HOLD
X (−2)
GATE
INT.
REF 3.6V
IC2401
ANALOG IC
TP2407
Ys
EXP. C (GRAY SCALE)
EXP. B (GRAY SCALE)
EXP. A (GRAY SCALE)
Ys (GRAY SCALE)
15KHz
15Hz
CU PEAK
ES PEAK
AF FRAME
DATA READ
DATA WRITE
ADDRESS READ
AD0
AD7
IC2402
DIGITAL IC
IC2414
IC2415
IC2416
PHASE DLAY
2413
z MOD.
Q2408
BUFFER
IRIS POSITION
ES
CU
EXP. A
EXP. B
EXP. C
DA VREF.
AD VREF.
3.6V
C-3
GAIN CONT.
HIGH BRIGHT DET
DATA READ
DATA WRITE
ADDRESS READ
AD0
AD7
15KHz
15Hz
IC2403
AF MI-COM
X OUT
X IN
X2401
10MHz
AF FRAME ON Ⓗ
DSP SELECT Ⓗ
AF-CS
S-CLOCK
S-DATA OUT
S-DATA IN
ZOOM SW 1
ZOOM SW 2
AF FAR
AF NEAR
TELE Ⓗ
WIDE Ⓗ
SPEED REF.
ZOOM 0
ZOOM 1
ZOOM 2
FOCUS 0
FOCUS 1
LED CONT.
RESET Ⓛ
NTSC Ⓗ /PAL Ⓛ
CAMERA 5V
IC2407
TP2405
AF FRAME
CN2407
AF FRAME
DSP SELECT Ⓗ
CN2401
AF-CS
S-CLOCK
S-DATA
S-DATA
TO PROCESS C.B.A.
CN2106
IC2411
PIEZO 5V REG.
PIEZO 5V
REG.
Q2407
CAMERA 5V
UNREG 6V
CN2405
UNREG 6V
TO FUSE BATTERY C.B.A.
CN1903
+3.6V
CN2407
+3.6V
ZOOM SW 1
ZOOM SW 2
MOTOR DRIVE
IC2410
AF MOTOR DRIVER
CN2404
AF FAR
AF NEAR
IC2409
ZOOM MOTOR DRIVER
SPEED CONT.
CN2403
TELE Ⓗ
WIDE Ⓗ
CN2402
ZOOM 0
ZOOM 1
ZOOM 2
FOCUS 0
FOCUS 1
LED CONT.
IC2408
RESET
CAMERA 5V
CAMERA-KEY C.B.A. (1/2)
CN2801
CN2804
TO VIDEO C.B.A.
CN203
CAMERA-KEY C.B.A. (2/2)
CN2801
+3.6V
ZOOM SW 1
ZOOM SW 2
CN2802
ZOOM SW 1
+3.6V
GND
CN2803
ZOOM SW 2
+3.6V
GND
ZOOM SW 1
ZOOM SW 2
W
T
A
B
C
D
E

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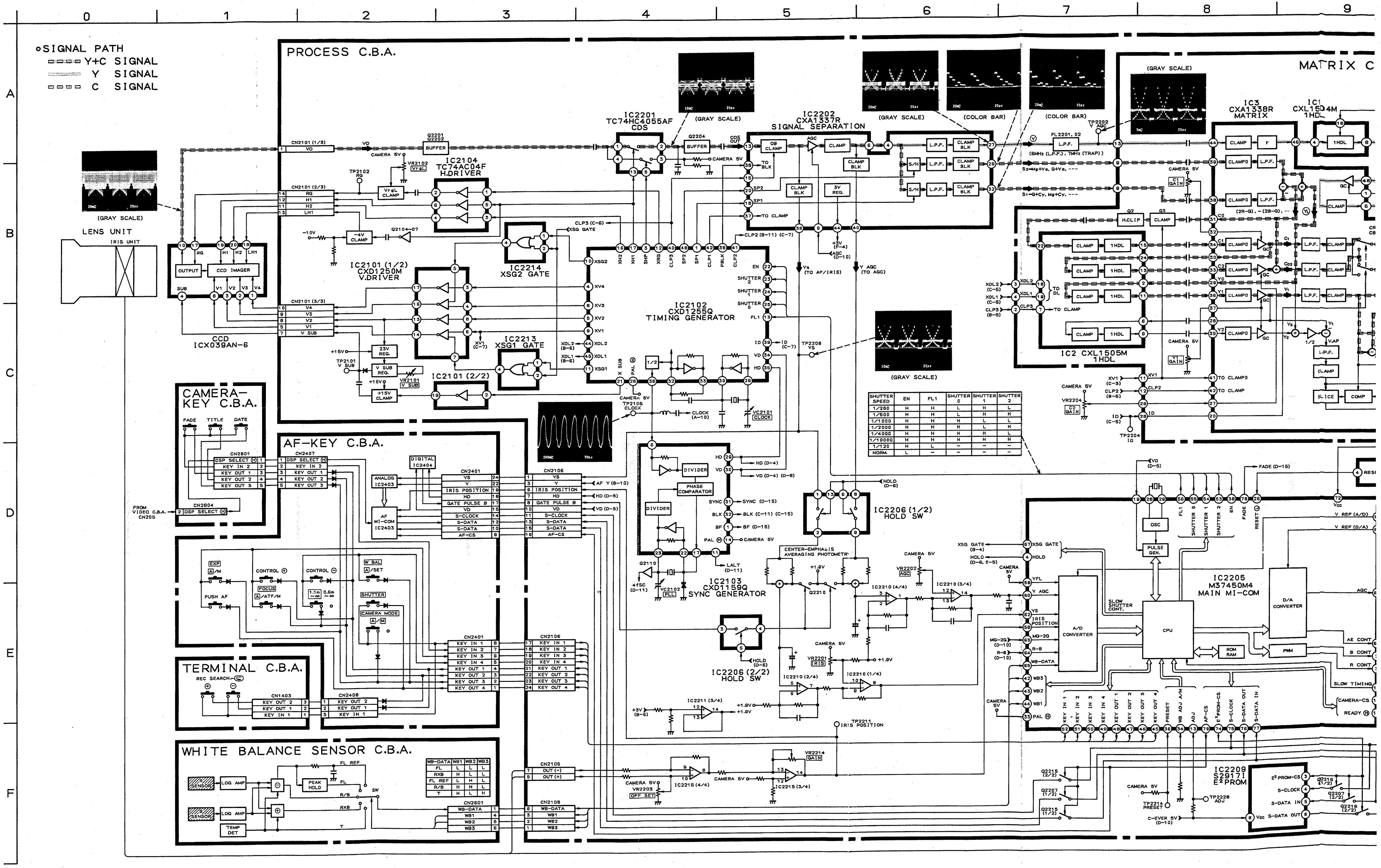
BLOCK DIAGRAM CAMERA SECTION (PROCESS C.B.A.)



0
1
2
3
4
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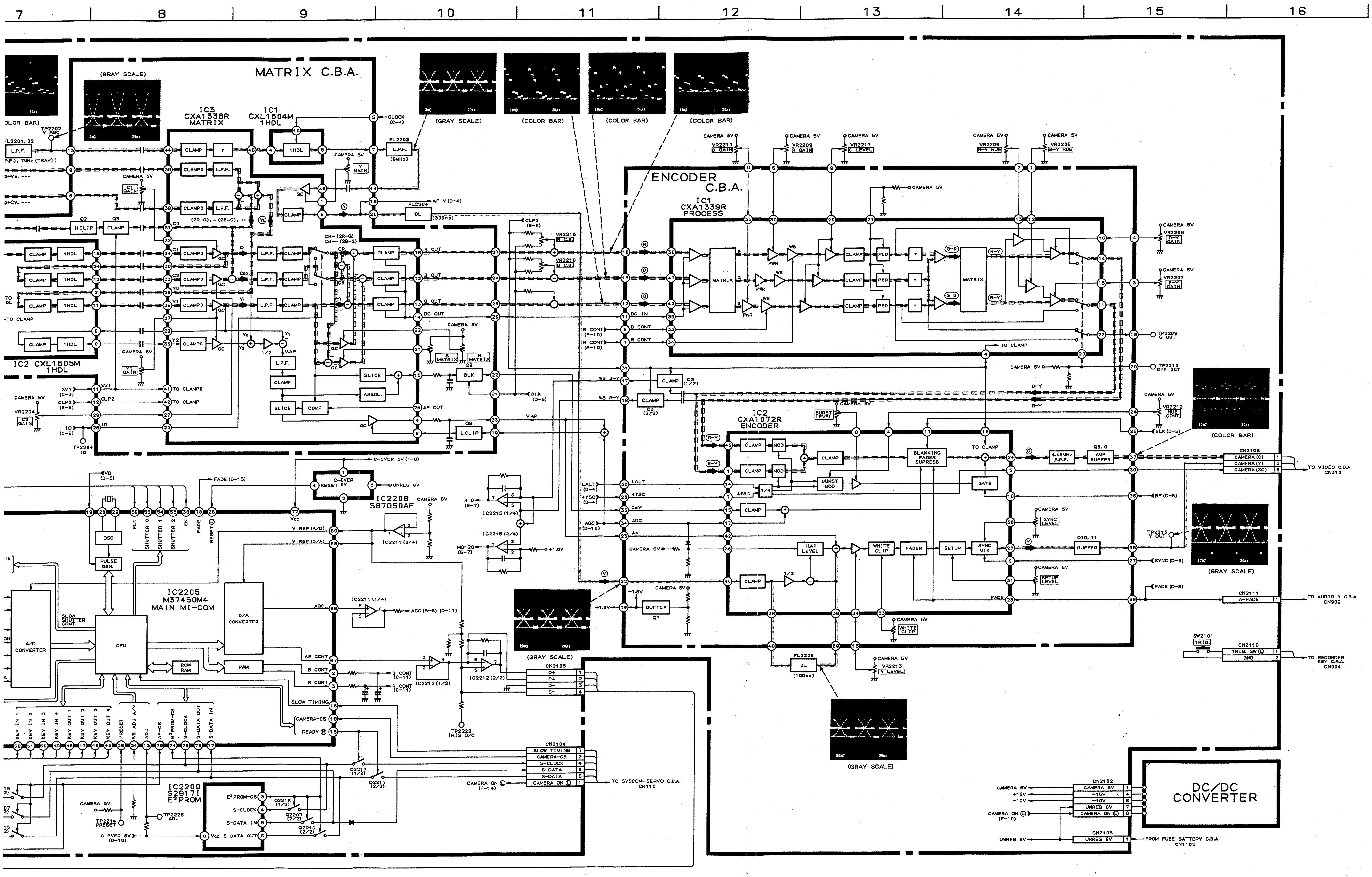
6
7
8
9
A
B
C
D
E
F
SIGNAL PATH
Y+C SIGNAL
Y SIGNAL
C SIGNAL
PROCESS C.B.A.
MATRIX C
(GRAY SCALE)
(COLOR BAR)
LENS UNIT
IRIS UNIT
OUTPUT
CCD IMAGER
SUB
CCD
ICX039AN-6
CN2101 (1/3)
CN2101 (2/3)
CN2101 (3/3)
BUFFER
Q2201
Q2202
IC2104
TC74AC04F
H.DRIVER
VrgL CLAMP
TP2102 RG
VR2102 VrgL
CAMERA 5V
-4V CLAMP
IC2101 (1/2)
CXD1250M
V.DRIVER
IC2101 (2/2)
23V REG.
V SUB REG.
VR2101 V SUB
+15V CLAMP
TP2101 V SUB
IC2214
XSG2 GATE
IC2213
XSG1 GATE
IC2201
TC74HC4055AF
CDS
Q2204
IC2202
CXA1337R
SIGNAL SEPARATION
OB CLAMP
AGC
CLAMP
CLAMP BLK
3V REG.
S/H
L.P.F.
IC2102
CXD1255Q
TIMING GENERATOR
TP2105 CLOCK
VC2101 CLOCK
TP2208 YS
IC2103
CXD1159Q
SYNC GENERATOR
DIVIDER
PHASE COMPARATOR
VC2102 PLL
IC2206 (1/2)
HOLD SW
IC2206 (2/2)
HOLD SW
CENTER-EMPHASIS AVERAGING PHOTOMETRY
IC2210 (4/4)
IC2210 (3/4)
IC2210 (2/4)
IC2210 (1/4)
VR2202 AGC
VR2201 IRIS
IC2211 (3/4)
TP2211 IRIS POSITION
IC2215 (4/4)
IC2215 (3/4)
VR2214 GAIN
VR2203 OFF SET
FL2201, 02
TP2202 Y AGC
IC3
CXA1338R
MATRIX
IC1
CXL1504M
1HDL
IC2 CXL1505M
1HDL
CLAMP0
H.CLIP
GC
C1 GAIN
C2 GAIN
Y1 GAIN
VR2204 C2 GAIN
TP2204 ID
SLICE
COMP
IC2205
M37450M4
MAIN MI-COM
A/D CONVERTER
CPU
OSC
PULSE GEN.
ROM RAM
D/A CONVERTER
PWM
SLOW SHUTTER CONT.
IC2209
S29171
E² PROM
TP2214 PRESET
TP2228 ADJ
Q2215
Q2207
Q2216
CAMERA-KEY C.B.A.
FADE
TITLE
DATE
CN2801
CN2804
FROM VIDEO C.B.A. CN205
AF-KEY C.B.A.
CN2407
DIGITAL IC2404
ANALOG IC2403
AF MI-COM IC2403
CN2401
CN2106
EXP A/M
CONTROL ⊕
CONTROL ⊖
W BAL A/SET
PUSH AF
FOCUS A/ATF/M
SHUTTER
CAMERA MODE A/M
TERMINAL C.B.A.
REC SEARCH
CN1403
CN2408
WHITE BALANCE SENSOR C.B.A.
SENSOR
LOG AMP
PEAK HOLD
TEMP DET
FL REF
SW
CN2601
CN2105
CN2108
AE CONT
B CONT
R CONT
SLOW TIMING
CAMERA-CS
READY
V REF (A/D)
V REF (D/A)

SHUTTER SPEED	EN	FL1	SHUTTER 0	SHUTTER 1	SHUTTER 2
1/250	H	H	L	H	L
1/500	H	H	L	H	H
1/1000	H	H	H	L	L
1/2000	H	H	H	L	H
1/4000	H	H	H	H	L
1/10000	H	H	H	H	H
1/120	H	L	–	–	–
NORM.	L	–	–	–	–

WB-DATA	WB1	WB2	WB3
FL	L	L	L
RXB	H	L	L
FL REF	L	H	L
R/B	H	H	L
T	H	L	H


7
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9
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11
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13
14
15
16
MATRIX C.B.A.
(GRAY SCALE)
(COLOR BAR)
IC3 CXA1338R MATRIX
IC1 CXL1504M 1HDL
IC2 CXL1505M 1HDL
FL2203 L.P.F. (6MHz)
FL2204 DL (300ns)
CLOCK (C-4)
AF Y (D-4)
CLAMP
CLAMP0
1HDL
L.P.F.
H.CLIP
SLICE
COMP
ABSOL.
BLK
L.CLIP
R OUT
B OUT
G OUT
DC OUT
AP OUT
TO CLAMP0
TO CLAMP
CAMERA 5V
C1 GAIN
C2 GAIN
Y GAIN
B MATRIX
R MATRIX
ENCODER C.B.A.
IC1 CXA1339R PROCESS
MATRIX
PED
PWR
WB
VR2210 B GAIN
VR2209 R GAIN
VR2211 C LEVEL
VR2206 R-Y HUE
VR2205 B-Y HUE
VR2208 R-Y GAIN
VR2207 B-Y GAIN
VR2212 HUE CONT
VR2213 Y LEVEL
TP2209 G OUT
TP2210 OFF SET
TP2213 Y OUT
IC2 CXA1072R ENCODER
BURST LEVEL
MOD
BURST MOD
BLANKING FADER SUPRESS
4.43MHz B.P.F.
Q8, 9 AMP BUFFER
GATE
1/4
HAP LEVEL
WHITE CLIP
FADER
SETUP
SYNC MIX
SYNC LEVEL
SETUP LEVEL
Q10, 11 BUFFER
BUFFER Q7
FL2205 DL (100ns)
CN2108 CAMERA (C) CAMERA (Y) CAMERA (SC)
TO VIDEO C.B.A. CN310
CN2111 A-FADE
TO AUDIO 1 C.B.A. CN902
SW2101 TRIG.
CN2110 TRIG. SW GND
TO RECORDER KEY C.B.A. CN004
IC2208 S87050AF
C-EVER RESET 5V
UNREG 5V
IC2205 M37450M4 MAIN MI-COM
CPU
OSC
PULSE GEN.
A/D CONVERTER
D/A CONVERTER
ROM RAM
PWM
SLOW SHUTTER CONT.
V REF (A/D)
V REF (D/A)
AGC
AE CONT
B CONT
R CONT
SLOW TIMING
CAMERA-CS
READY
IC2211 (1/4)
IC2211 (2/4)
IC2212 (1/2)
IC2212 (2/2)
IC2215 (1/4)
IC2215 (2/4)
TP2222 IRIS O/C
CN2105 D+ C+ D- C-
CN2104 SLOW TIMING CAMERA-CS S-CLOCK S-DATA S-DATA CAMERA ON
TO SYSCON-SERVO C.B.A. CN110
IC2209 S29171 E²PROM
E²PROM-CS
S-CLOCK
S-DATA IN
S-DATA OUT
TP2214 PRESET
TP2228 ADJ
KEY IN 1
KEY IN 2
KEY IN 3
KEY IN 4
KEY OUT 1
KEY OUT 2
KEY OUT 3
KEY OUT 4
PRESET
WB ADJ A/M
ADJ
AF-CS
E²PROM-CS
S-CLOCK
S-DATA OUT
S-DATA IN
SHUTTER 0
SHUTTER 1
SHUTTER 2
FADE
RESET
DC/DC CONVERTER
CN2102 CAMERA 5V +15V -10V UNREG 6V CAMERA ON
CN2103 UNREG 6V
FROM FUSE BATTERY C.B.A. CN1105

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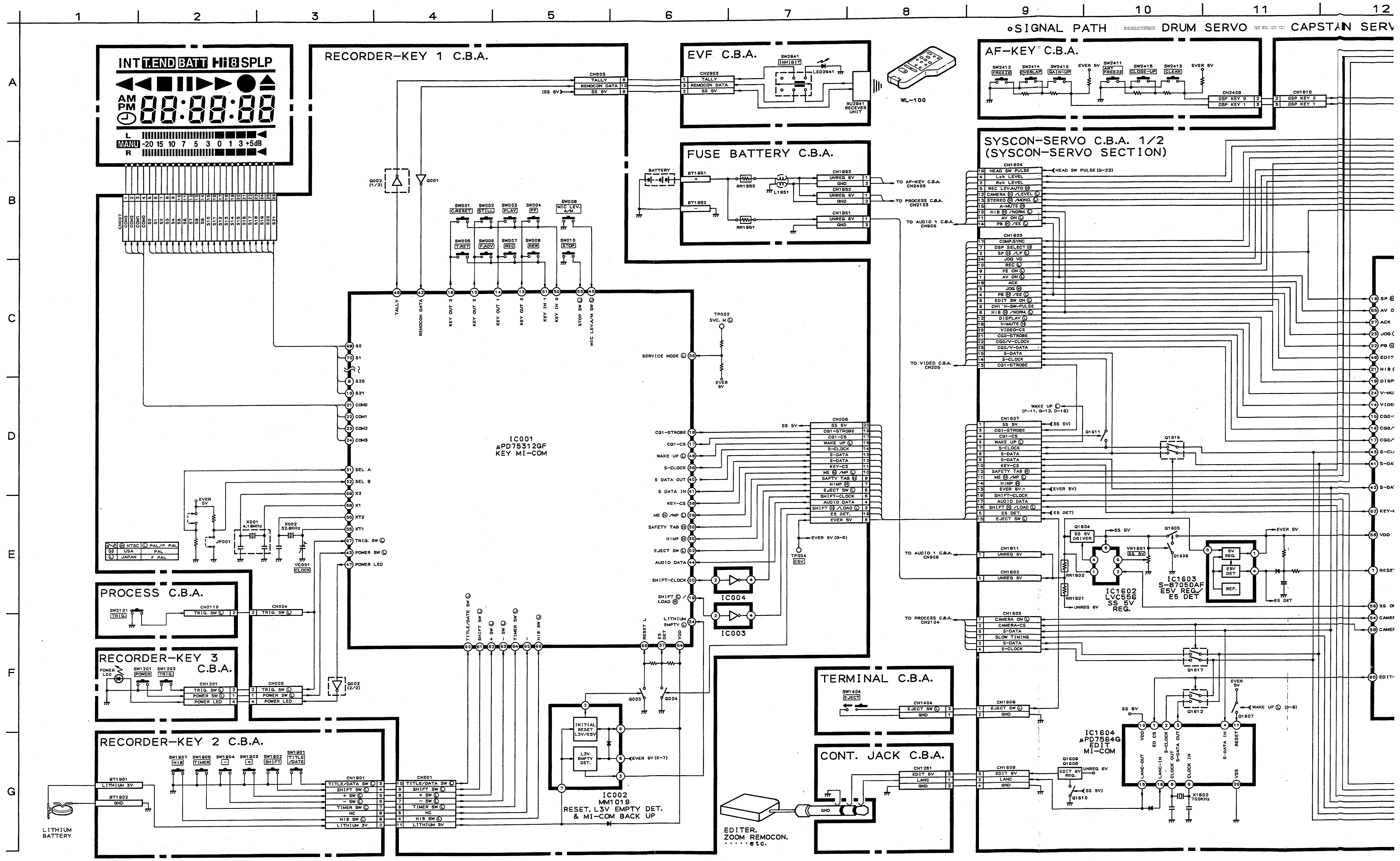
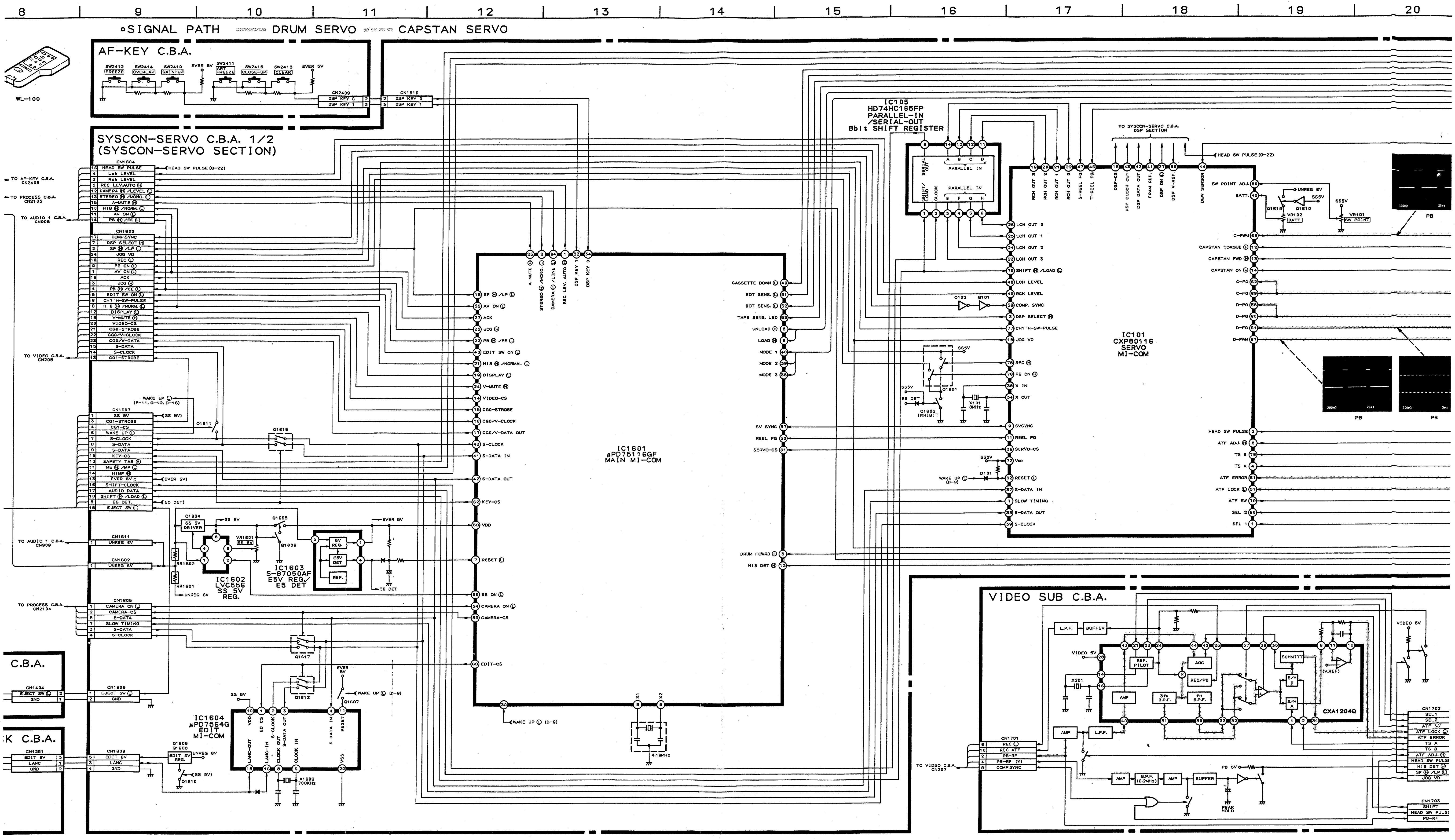
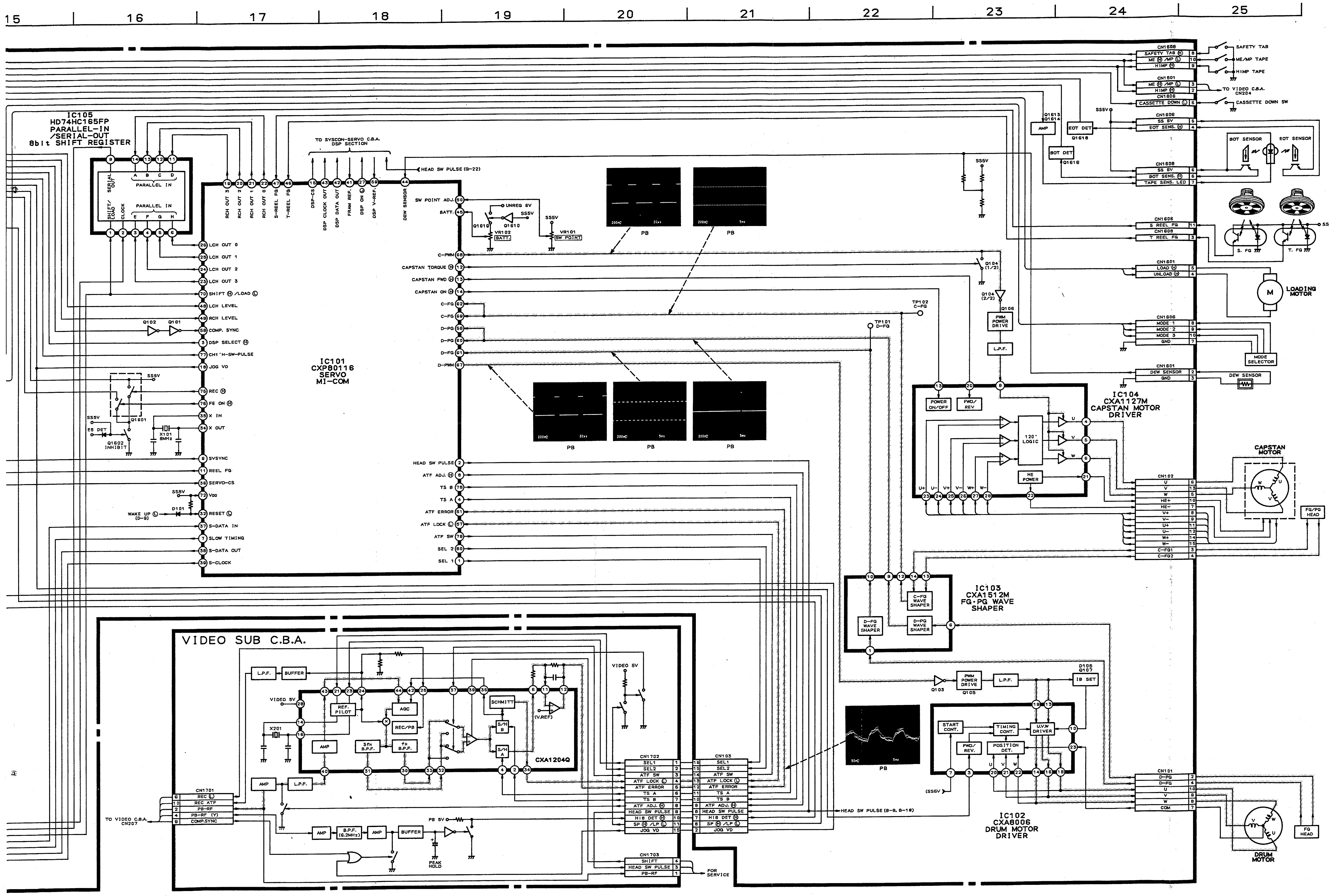
BLOCK DIAGRAM SYSCON-SERVO SECTION



○SIGNAL PATH
DRUM SERVO
CAPSTAN SERV
RECORDER-KEY 1 C.B.A.
EVF C.B.A.
WL-100
AF-KEY C.B.A.
FUSE BATTERY C.B.A.
SYSCON-SERVO C.B.A. 1/2
(SYSCON-SERVO SECTION)
IC001
μPD75312GF
KEY MI-COM
PROCESS C.B.A.
RECORDER-KEY 3 C.B.A.
RECORDER-KEY 2 C.B.A.
LITHIUM BATTERY
IC004
IC003
IC002
MM1019
RESET, L3V EMPTY DET.
& MI-COM BACK UP
TERMINAL C.B.A.
CONT. JACK C.B.A.
EDITER,
ZOOM REMOCON,
······etc.
IC1602
LVC556
SS 5V
REG.
IC1603
S-87050AF
E5V REG./
E5 DET
IC1604
μPD7564G
EDIT
MI-COM
TO AF-KEY C.B.A. CN2405
TO PROCESS C.B.A. CN2103
TO AUDIO 1 C.B.A. CN905
TO VIDEO C.B.A. CN205
TO AUDIO 1 C.B.A. CN906
TO PROCESS C.B.A. CN2104

01 Nov. 1990

8
9
10
11
12
13
14
15
16
17
18
19
20
SIGNAL PATH
DRUM SERVO
CAPSTAN SERVO
WL-100
AF-KEY C.B.A.
SW2412 FREEZE
SW2414 OVERLAP
SW2410 GAIN-UP
SW2411 ART FREEZE
SW2415 CLOSE-UP
SW2413 CLEAR
EVER 5V
CN2409
CN1610
DSP KEY 0
DSP KEY 1
SYSCON-SERVO C.B.A. 1/2
(SYSCON-SERVO SECTION)
CN1604
HEAD SW PULSE
Lch LEVEL
Rch LEVEL
REC LEV.AUTO
CAMERA /LEVEL
STEREO /MONO.
A-MUTE
HI8 /NORM.
AV ON
PB /EE
TO AF-KEY C.B.A. CN2405
TO PROCESS C.B.A. CN2103
TO AUDIO 1 C.B.A. CN906
CN1603
COMP.SYNC
DSP SELECT
SP /LP
JOG VD
REC
FE ON
AV ON
ACK
JOG
PB /EE
EDIT SW ON
CH1'H-SW-PULSE
HI8 /NORM.
DISPLAY
V-MUTE
VIDEO-CS
CG0-STROBE
CG0/V-CLOCK
CG0/V-DATA
S-DATA
S-CLOCK
CG1-STROBE
TO VIDEO C.B.A. CN205
CN1607
SS 5V
CG1-STROBE
CG1-CS
WAKE UP
S-CLOCK
S-DATA
S-DATA
KEY-CS
SAFETY TAB
ME /MP
HIMP
EVER 5V
SHIFT-CLOCK
AUDIO DATA
SHIFT /LOAD
E5 DET.
EJECT SW
WAKE UP (F-11, G-12, D-16)
Q1611
Q1615
Q1604 SS 5V DRIVER
Q1605
Q1606
VR1601 SS 5V
RR1602
RR1601
UNREG 6V
IC1602 LVC556 SS 5V REG.
IC1603 S-87050AF E5V REG./ E5 DET
5V REG.
E5V DET
REF.
E5 DET
TO AUDIO 1 C.B.A. CN909
CN1611
UNREG 6V
CN1602
UNREG 6V
TO PROCESS C.B.A. CN2104
CN1605
CAMERA ON
CAMERA-CS
S-DATA
SLOW TIMING
S-DATA
S-CLOCK
Q1617
Q1612
Q1607
C.B.A.
CN1404
EJECT SW
GND
CN1609
K C.B.A.
CN1251
EDIT 6V
LANC
GND
Q1609 Q1608 EDIT 6V REG.
Q1610
IC1604 μPD7564G EDIT MI-COM
X1602 700KHz
LANC-OUT
LANC-IN
CLOCK OUT
CLOCK IN
S-DATA IN
RESET
VSS
VDD
ED CS
S-CLOCK
S-DATA OUT
IC1601 μPD75116GF MAIN MI-COM
A-MUTE
STEREO /MONO.
CAMERA /LINE
REC LEV. AUTO
DSP KEY 1
DSP KEY 0
SP /LP
AV ON
ACK
JOG
PB /EE
EDIT SW ON
HI8 /NORMAL
DISPLAY
V-MUTE
VIDEO-CS
CG0-STROBE
CG0/V-CLOCK
CG0/V-DATA OUT
S-CLOCK
S-DATA IN
S-DATA OUT
KEY-CS
VDD
RESET
SS ON
CAMERA ON
CAMERA-CS
EDIT-CS
WAKE UP (D-9)
X1
X2
4.19MHz
CASSETTE DOWN
EOT SENS.
BOT SENS.
TAPE SENS. LED
UNLOAD
LOAD
MODE 1
MODE 2
MODE 3
SV SYNC
REEL FG
SERVO-CS
DRUM FOWRD
HI8 DET
IC105 HD74HC165FP PARALLEL-IN /SERIAL-OUT 8bit SHIFT REGISTER
SERIAL OUT
PARALLEL IN
SHIFT/ LOAD
CLOCK
Q102
Q101
Q1601
Q1602 INHIBIT
E5 DET
X101 8MHz
D101
WAKE UP (D-9)
IC101 CXP80116 SERVO MI-COM
LCH OUT 0
LCH OUT 1
LCH OUT 2
LCH OUT 3
SHIFT /LOAD
LCH LEVEL
RCH LEVEL
COMP. SYNC
DSP SELECT
CH1'H-SW-PULSE
JOG VD
REC
FE ON
X IN
X OUT
SVSYNC
REEL FG
SERVO-CS
VDD
RESET
S-DATA IN
SLOW TIMING
S-DATA OUT
S-CLOCK
RCH OUT 3
RCH OUT 2
RCH OUT 1
RCH OUT 0
S-REEL FG
T-REEL FG
DSP-CS
DSP CLOCK OUT
DSP DATA OUT
FRAM REF.
DSP ON
DSP V-REF.
DEW SENSOR
TO SYSCON-SERVO C.B.A. DSP SECTION
HEAD SW PULSE (G-22)
SW POINT ADJ.
BATT.
UNREG 6V
Q1619
Q1610
VR102 BATT.
VR101 SW POINT
C-PWM
CAPSTAN TORQUE
CAPSTAN FWD
CAPSTAN ON
C-FG
C-FG
D-FG
D-FG
D-FG
D-PWM
HEAD SW PULSE
ATF ADJ.
TS B
TS A
ATF ERROR
ATF LOCK
ATF SW
SEL 2
SEL 1
PB
PB
PB
VIDEO SUB C.B.A.
L.P.F.
BUFFER
VIDEO 5V
REF. PILOT
AGC
REC/PB
AMP
3fH B.P.F.
fH B.P.F.
SCHMITT
S/H B
S/H A
(V.REF)
X201
CXA1204Q
AMP
L.P.F.
CN1701
REC
REC ATF
PB-RF
PB-RF (Y)
COMP.SYNC
TO VIDEO C.B.A. CN207
AMP
B.P.F. (6.2MHz)
AMP
BUFFER
PB 5V
PEAK HOLD
CN1702
SEL1
SEL2
ATF SW
ATF LOCK
ATF ERROR
TS A
TS B
ATF ADJ.
HEAD SW PULSE
HI8 DET
SP /LP
JOG VD
CN1703
SHIFT
HEAD SW PULSE
PB-RF


15
16
17
18
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22
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IC105
HD74HC165FP
PARALLEL-IN
/SERIAL-OUT
8bit SHIFT REGISTER
TO SYSCON-SERVO C.B.A.
DSP SECTION
HEAD SW PULSE (G-22)
IC101
CXP80116
SERVO
MI-COM
LCH OUT 0
LCH OUT 1
LCH OUT 2
LCH OUT 3
LCH LEVEL
RCH LEVEL
COMP. SYNC
DSP SELECT
CH1'H-SW-PULSE
JOG VD
REC
FE ON
X IN
X OUT
SVSYNC
REEL FG
SERVO-CS
VDD
RESET
S-DATA IN
SLOW TIMING
S-DATA OUT
S-CLOCK
SW POINT ADJ.
BATT.
C-PWM
CAPSTAN TORQUE
CAPSTAN FWD
CAPSTAN ON
C-FG
D-PG
D-FG
D-PWM
HEAD SW PULSE
ATF ADJ.
TS B
TS A
ATF ERROR
ATF LOCK
ATF SW
SEL 2
SEL 1
UNREG 6V
S5V
VR102 BATT.
VR101 SW POINT
X101 8MHz
Q101
Q102
Q1601
Q1602 INHIBIT
Q1610
Q1619
D101
WAKE UP (D-9)
ES DET
PB
TP102 C-FG
TP101 D-FG
Q104 (1/2)
Q104 (2/2)
Q106
PWM POWER DRIVE
L.P.F.
IC104
CXA1127M
CAPSTAN MOTOR
DRIVER
POWER ON/OFF
FWD/REV
120° LOGIC
HE POWER
IC103
CXA1512M
FG·PG WAVE
SHAPER
C-FG WAVE SHAPER
D-FG WAVE SHAPER
D-PG WAVE SHAPER
Q103
Q105
D105
Q107
18 SET
IC102
CXA8006
DRUM MOTOR
DRIVER
START CONT.
FWD/REV.
TIMING CONT.
POSITION DET.
U.V.W DRIVER
CN1608
SAFETY TAB
ME/MP
HIMP
SAFETY TAB
ME/MP TAPE
HIMP TAPE
CN1501
TO VIDEO C.B.A. CN204
CASSETTE DOWN
CASSETTE DOWN SW
Q1613 Q1614
AMP
EOT DET
Q1616
BOT DET
S5 5V
EOT SENS.
BOT SENSOR
EOT SENSOR
BOT SENS.
TAPE SENS. LED
S REEL FG
T REEL FG
S. FG
T. FG
CN1601
LOAD
UNLOAD
LOADING MOTOR
MODE 1
MODE 2
MODE 3
GND
MODE SELECTOR
DEW SENSOR
CAPSTAN MOTOR
CN102
FG/PG HEAD
CN101
DRUM MOTOR
FG HEAD
VIDEO SUB C.B.A.
L.P.F.
BUFFER
VIDEO 5V
REF. PILOT
AGC
REC/PB
SCHMITT
S/H B
S/H A
(V.REF)
X201
AMP
3fH B.P.F.
fH B.P.F.
CXA1204Q
CN1701
REC
REC ATF
PB-RF
PB-RF (Y)
COMP.SYNC
TO VIDEO C.B.A. CN207
B.P.F. (6.2MHz)
PB 5V
PEAK HOLD
CN1702
CN103
SEL1
SEL2
ATF SW
ATF LOCK
ATF ERROR
TS A
TS B
ATF ADJ.
HEAD SW PULSE
HI8 DET
SP/LP
JOG VD
HEAD SW PULSE (B-9, B-19)
CN1703
SHIFT
PB-RF
FOR SERVICE
(S5V)

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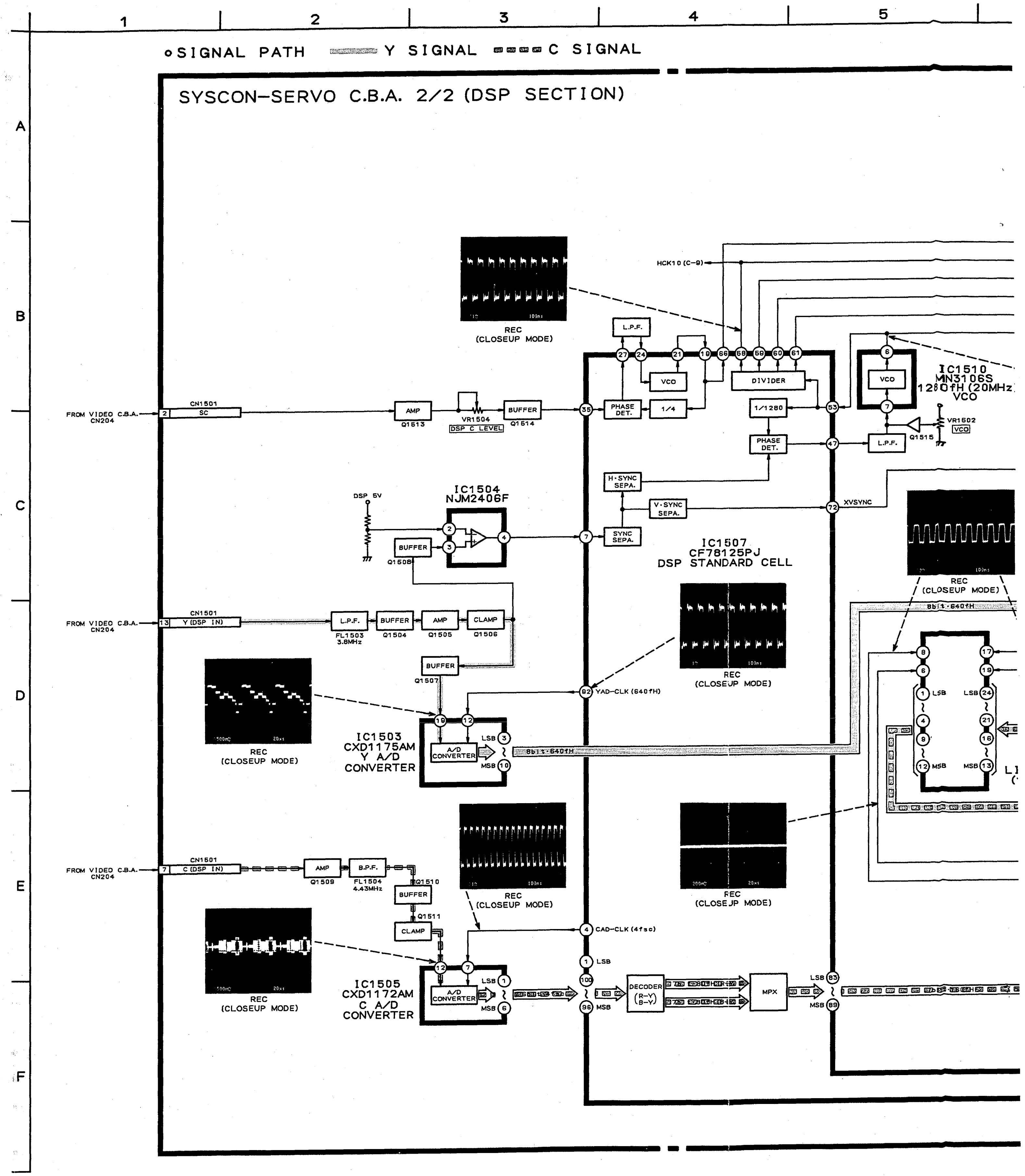
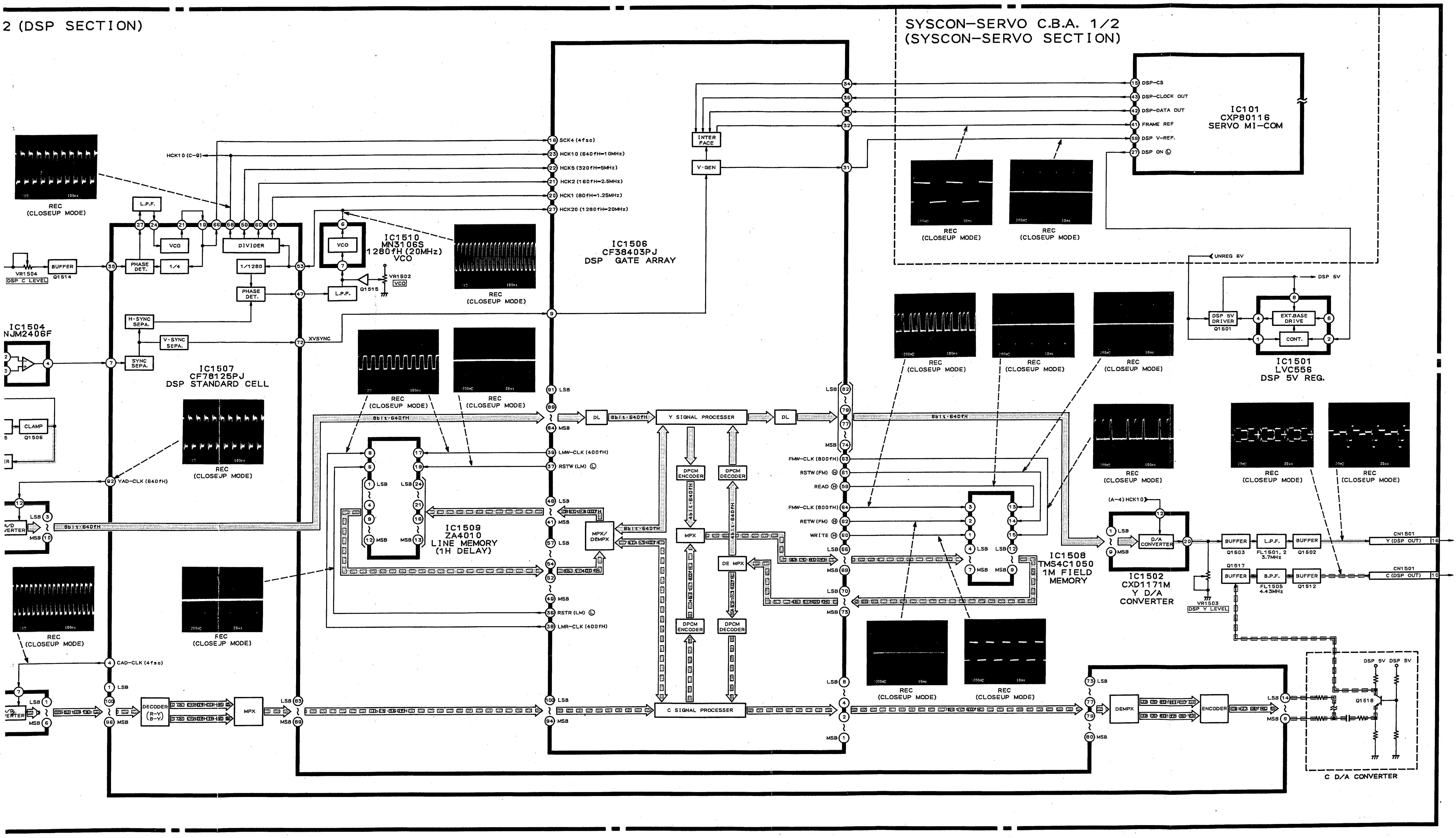
BLOCK DIAGRAM DIGITAL SIGNAL PROCESS SECTION

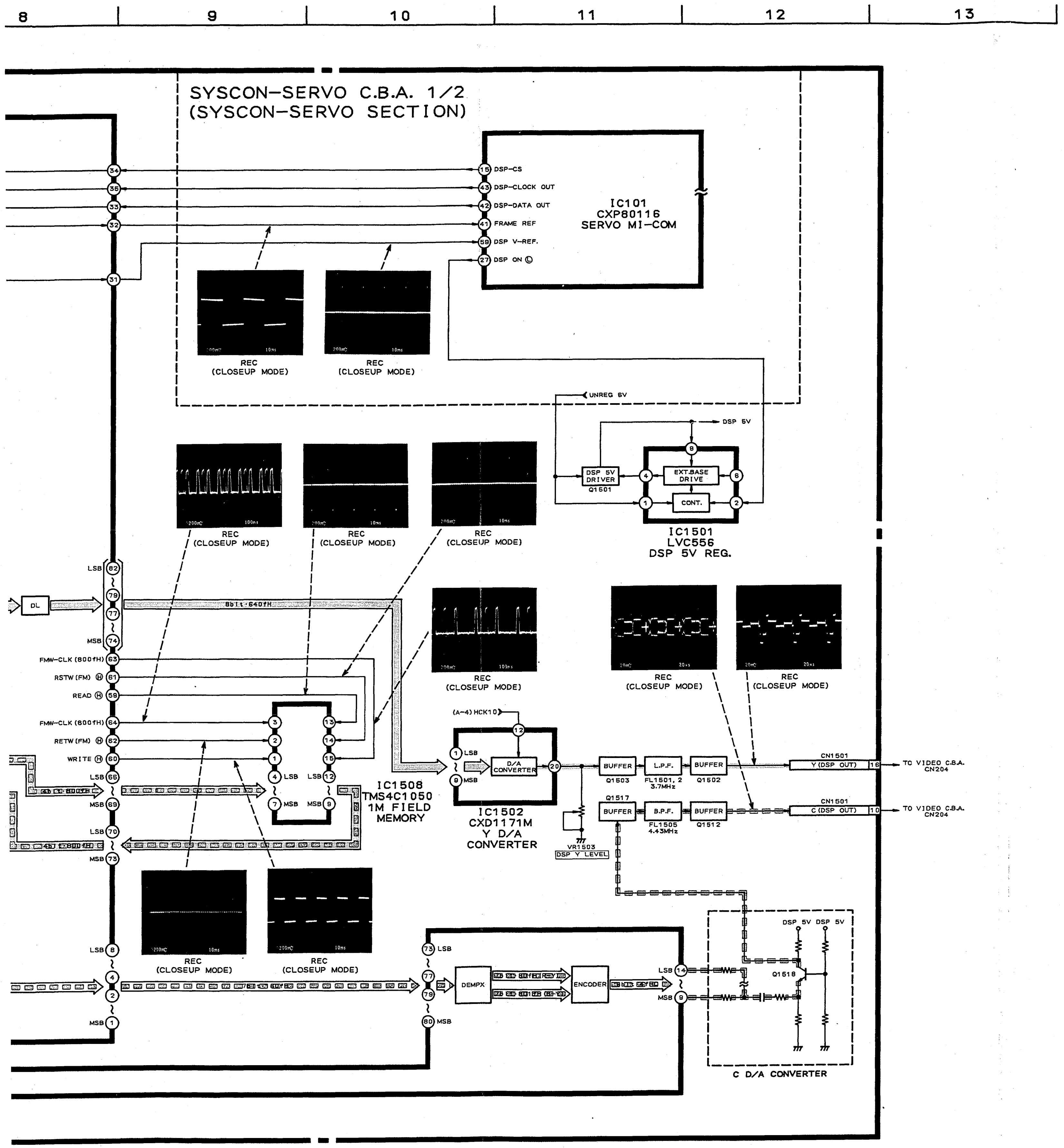

1
2
3
4
5
A
B
C
D
E
F
○SIGNAL PATH
Y SIGNAL
C SIGNAL
SYSCON–SERVO C.B.A. 2/2 (DSP SECTION)
FROM VIDEO C.B.A. CN204
CN1501
2
SC
AMP
Q1513
VR1504
DSP C LEVEL
BUFFER
Q1514
FROM VIDEO C.B.A. CN204
CN1501
13
Y (DSP IN)
L.P.F.
FL1503 3.8MHz
BUFFER
Q1504
AMP
Q1505
CLAMP
Q1506
BUFFER
Q1507
DSP 5V
IC1504
NJM2406F
BUFFER
Q1508
FROM VIDEO C.B.A. CN204
CN1501
7
C (DSP IN)
AMP
Q1509
B.P.F.
FL1504 4.43MHz
Q1510
BUFFER
Q1511
CLAMP
REC (CLOSEUP MODE)
IC1503
CXD1175AM
Y A/D CONVERTER
A/D CONVERTER
LSB
MSB
8bit·640fH
IC1505
CXD1172AM
C A/D CONVERTER
A/D CONVERTER
LSB
MSB
IC1507
CF78125PJ
DSP STANDARD CELL
L.P.F.
VCO
PHASE DET.
1/4
DIVIDER
1/1280
PHASE DET.
H·SYNC SEPA.
V·SYNC SEPA.
SYNC SEPA.
HCK10 (C–9)
XVSYNC
YAD–CLK (640fH)
CAD–CLK (4fsc)
LSB
MSB
DECODER (R–Y) (B–Y)
MPX
LSB
MSB
IC1510
MN3106S
1280fH (20MHz)
VCO
VCO
L.P.F.
Q1515
VR1502
VCO
8bit·640fH
LSB
MSB
LSB
MSB
REC (CLOSEUP MODE)

IGNAL PROCESS SECTION

3 4 5 6 7 8 9 10 11 12 13

NAL ▬▬ C SIGNAL

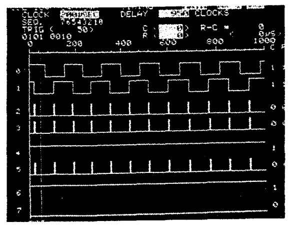

2 (DSP SECTION)
SYSCON-SERVO C.B.A. 1/2
(SYSCON-SERVO SECTION)
IC101
CXP80116
SERVO MI-COM
DSP-CS
DSP-CLOCK OUT
DSP-DATA OUT
FRAME REF
DSP V-REF.
DSP ON Ⓛ
INTER FACE
V-GEN
SCK4 (4fsc)
HCK10 (640fH=10MHz)
HCK5 (320fH=5MHz)
HCK2 (160fH=2.5MHz)
HCK1 (80fH=1.25MHz)
HCK20 (1280fH=20MHz)
HCK10 (C-9)
IC1506
CF38403PJ
DSP GATE ARRAY
IC1510
MN3106S
1280fH (20MHz)
VCO
VR1502
VCO
Q1515
L.P.F.
DIVIDER
1/1280
PHASE DET.
1/4
H-SYNC SEPA.
V-SYNC SEPA.
SYNC SEPA.
XVSYNC
BUFFER
Q1514
VR1504
DSP C LEVEL
IC1504
NJM2406F
IC1507
CF78125PJ
DSP STANDARD CELL
CLAMP
Q1506
YAD-CLK (640fH)
A/D CONVERTER
8bit·640fH
CAD-CLK (4fsc)
DECODER (R-Y) (B-Y)
MPX
REC (CLOSEUP MODE)
LSB
MSB
DL
Y SIGNAL PROCESSER
LMW-CLK (400fH)
RSTW (LM) Ⓛ
RSTR (LM) Ⓛ
LMR-CLK (400fH)
IC1509
ZA4010
LINE MEMORY
(1H DELAY)
MPX/DEMPX
DPCM ENCODER
DPCM DECODER
4bit·640fH
DE MPX
C SIGNAL PROCESSER
FMW-CLK (800fH)
RSTW (FM) Ⓗ
READ Ⓗ
FMR-CLK (800fH)
RETW (FM) Ⓗ
WRITE Ⓗ
IC1508
TMS4C1050
1M FIELD
MEMORY
(A-4) HCK10
D/A CONVERTER
IC1502
CXD1171M
Y D/A
CONVERTER
UNREG 6V
DSP 6V
DSP 5V DRIVER
Q1501
EXT.BASE DRIVE
CONT.
IC1501
LVC556
DSP 5V REG.
BUFFER
Q1503
L.P.F.
FL1501, 2
3.7MHz
Q1502
Q1517
B.P.F.
FL1505
4.43MHz
Q1512
VR1503
DSP Y LEVEL
CN1501
Y (DSP OUT)
C (DSP OUT)
TO VIDEO C.B.A.
CN204
DEMPX
ENCODER
DSP 5V
Q1518
C D/A CONVERTER


8
9
10
11
12
13
SYSCON-SERVO C.B.A. 1/2
(SYSCON-SERVO SECTION)
IC101
CXP80116
SERVO MI-COM
15 DSP-CS
43 DSP-CLOCK OUT
42 DSP-DATA OUT
41 FRAME REF
59 DSP V-REF.
27 DSP ON Ⓛ
34
35
33
32
31
REC
(CLOSEUP MODE)
UNREG 5V
DSP 5V
DSP 5V DRIVER
Q1501
EXT.BASE DRIVE
CONT.
IC1501
LVC556
DSP 5V REG.
DL
8bit 640fH
LSB 82
79
77
MSB 74
FMW-CLK (800fH) 63
RSTW (FM) Ⓗ 61
READ Ⓗ 59
FMW-CLK (800fH) 64
RETW (FM) Ⓗ 62
WRITE Ⓗ 60
LSB 66
MSB 69
LSB 70
MSB 73
4bit 800fH
IC1508
TMS4C1050
1M FIELD
MEMORY
(A-4) HCK10
D/A CONVERTER
IC1502
CXD1171M
Y D/A
CONVERTER
VR1503
DSP Y LEVEL
BUFFER
Q1503
L.P.F.
FL1501, 2
3.7MHz
BUFFER
Q1502
Q1517
BUFFER
B.P.F.
FL1505
4.43MHz
BUFFER
Q1512
CN1501
Y (DSP OUT) 16
CN1501
C (DSP OUT) 10
TO VIDEO C.B.A.
CN204
LSB 8
4
2
MSB 1
73 LSB
77
79
80 MSB
DEMPX
ENCODER
LSB 14
MSB 9
DSP 5V DSP 5V
Q1518
C D/A CONVERTER

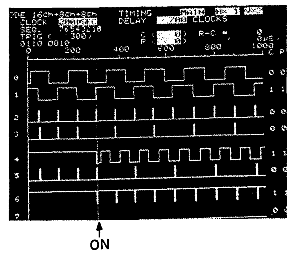
TIMING CHART

0 : FRAME REF. (IC1506-32)
1 : HEAD SW PULSE
2 : DSP V-REF. (IC1506-31)
3 : RSTW (FM) Ⓗ (IC1506-62)
4 : WRITE Ⓗ (IC1506-60)
5 : RSTR (FM) Ⓗ (IC1506-61)
6 : READ Ⓗ (IC1506-59)
7 : –

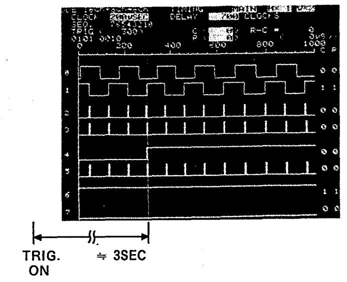
1. NORMAL REC (WITHOUT DSP)



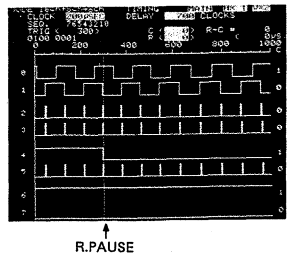
2. CLOSE UP



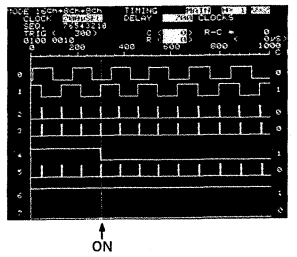
3. OVERLAP
(R.PAUSE → REC)



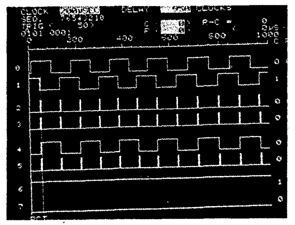
4. OVERLAP
(REC → R.PAUSE)



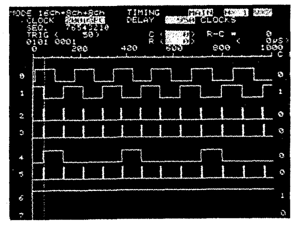
5. FREEZE/ART FREEZE



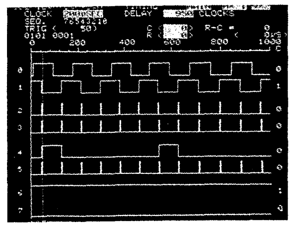
6. SLOW SHUTTER (1/25)



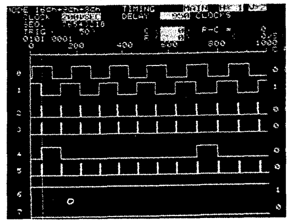
7. SLOW SHUTTER (1/12)



8. SLOW SHUTTER (1/8)



9. SLOW SHUTTER (1/6)
FREEZE } PRESS AND HOLD
ART FREEZE }



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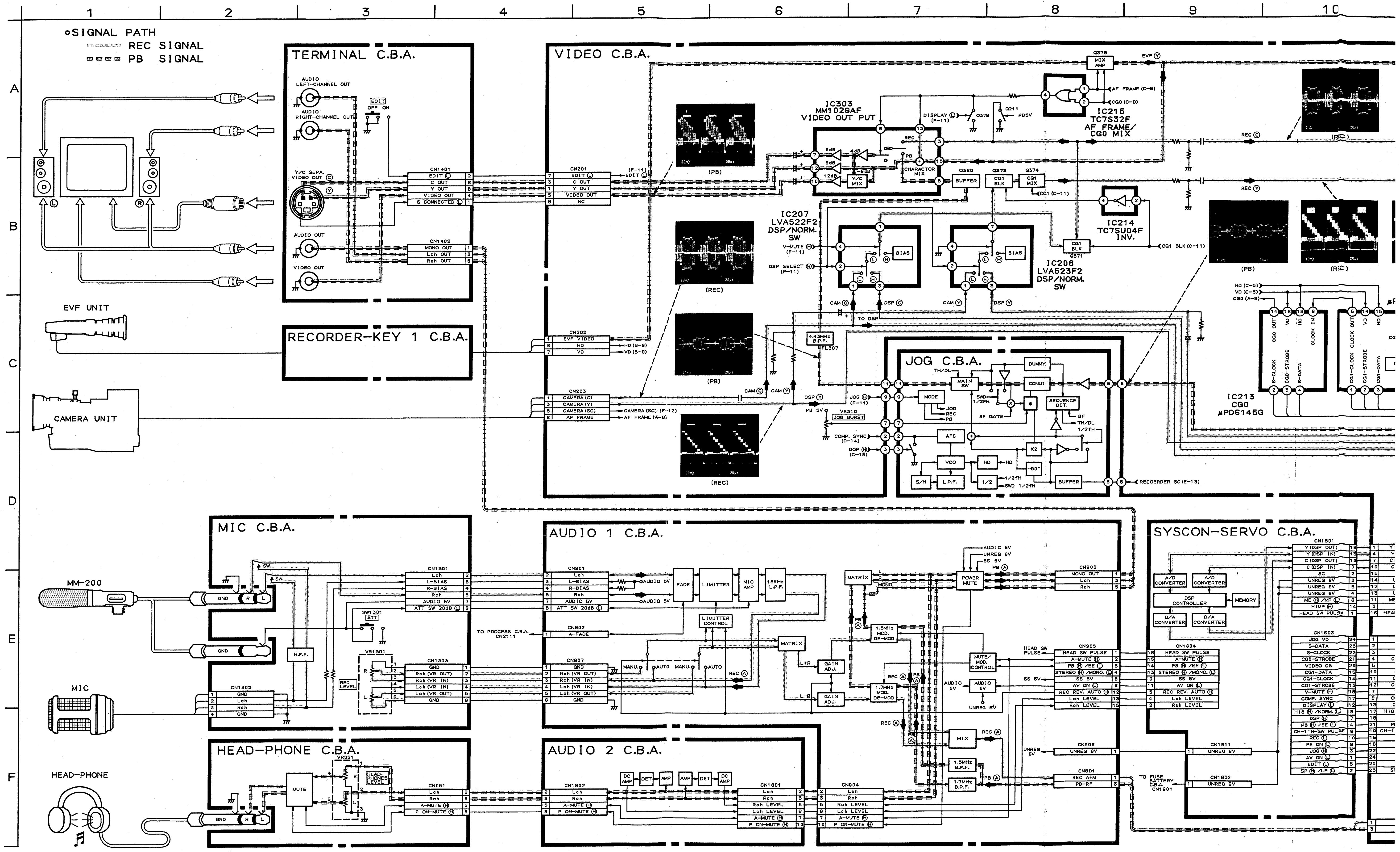
BLOCK DIAGRAM AUDIO-VIDEO SECTION



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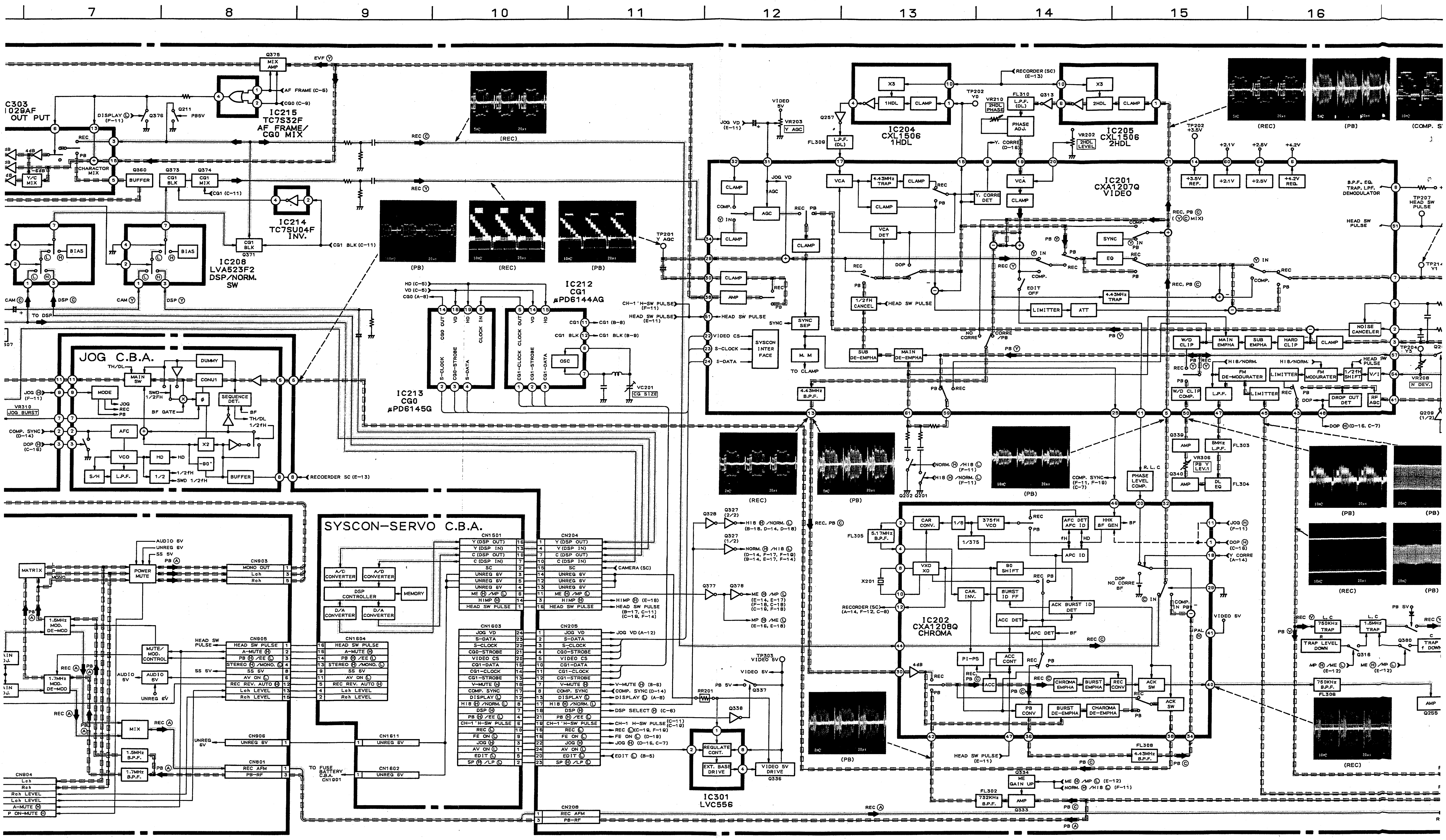
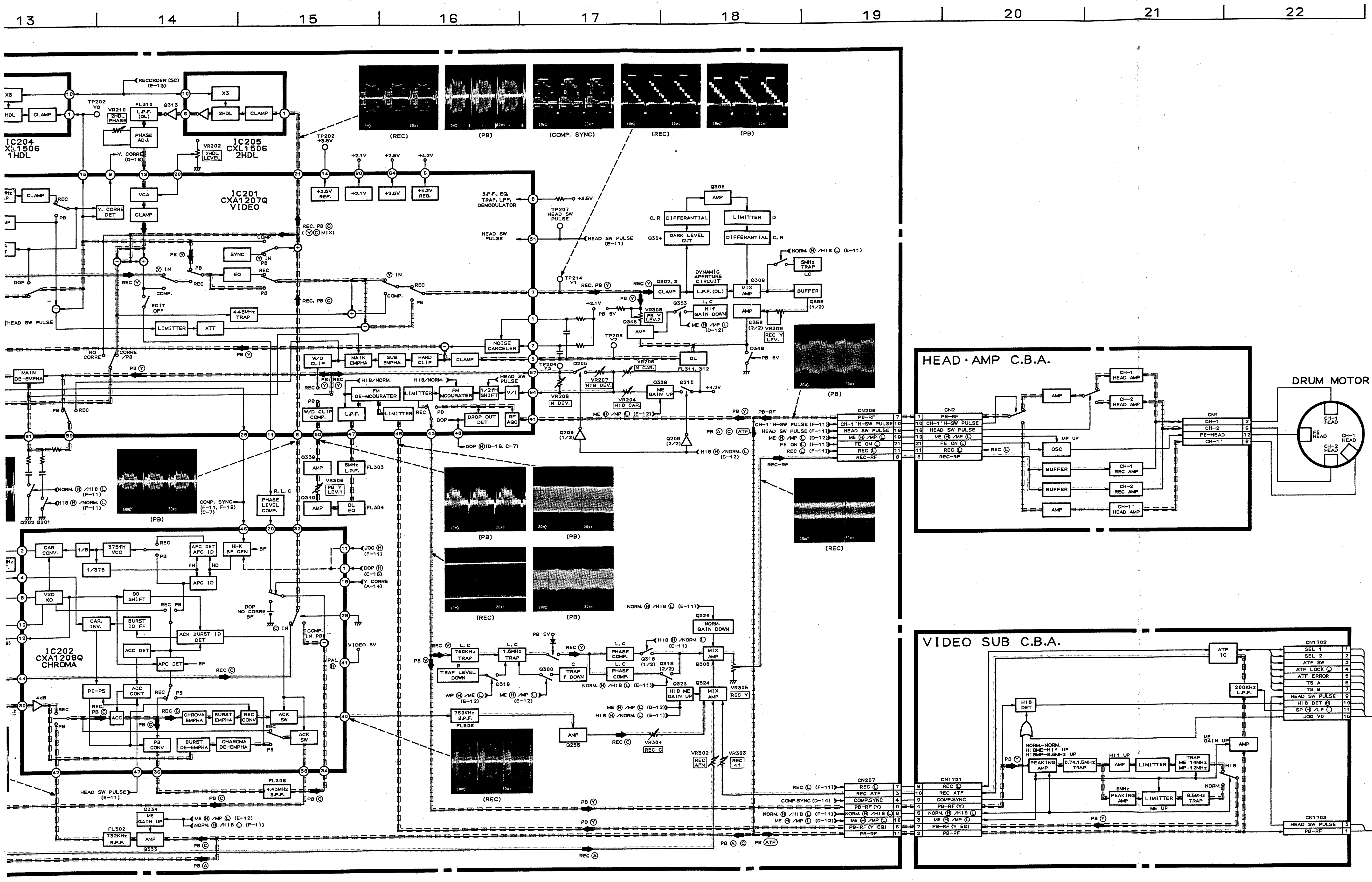
A
B
C
D
E
F
SIGNAL PATH
REC SIGNAL
PB SIGNAL
TERMINAL C.B.A.
AUDIO LEFT-CHANNEL OUT
AUDIO RIGHT-CHANNEL OUT
EDIT
OFF ON
Y/C SEPA. VIDEO OUT
AUDIO OUT
VIDEO OUT
CN1401
EDIT Ⓛ
C OUT
Y OUT
VIDEO OUT
S CONNECTED Ⓛ
CN1402
MONO OUT
Lch OUT
Rch OUT
VIDEO C.B.A.
CN201
EDIT Ⓛ
C OUT
Y OUT
VIDEO OUT
NC
(F-11)
EDIT Ⓛ
EVF UNIT
RECORDER-KEY 1 C.B.A.
CN202
EVF VIDEO
HD
VD
HD (B-9)
VD (B-9)
CAMERA UNIT
CN203
CAMERA (C)
CAMERA (Y)
CAMERA (SC)
AF FRAME
CAMERA (SC) (F-12)
AF FRAME (A-8)
(PB)
(REC)
(PB)
(REC)
IC303
MM1029AF
VIDEO OUT PUT
6dB
4dB
12dB
Y/C MIX
CHARACTOR MIX
REC
PB
DISPLAY Ⓛ (F-11)
Q376
Q211
PB5V
Q375
MIX AMP
EVF Ⓨ
IC215
TC7S32F
AF FRAME/CG0 MIX
AF FRAME (C-6)
CG0 (C-9)
Q360
BUFFER
Q373
CG1 BLK
Q374
CG1 MIX
CG1 (C-11)
IC214
TC7SU04F
INV.
CG1 BLK
Q371
CG1 BLK (C-11)
REC Ⓒ
REC Ⓨ
IC207
LVA522F2
DSP/NORM. SW
V-MUTE Ⓗ (F-11)
DSP SELECT Ⓗ (F-11)
BIAS
IC208
LVA523F2
DSP/NORM. SW
CAM Ⓒ
DSP Ⓒ
CAM Ⓨ
DSP Ⓨ
TO DSP
4.43MHz B.P.F.
FL307
JOG C.B.A.
TH/DL
MAIN SW
DUMMY
CONU1
MODE
JOG
REC
PB
SWD 1/2FH
BF GATE
SEQUENCE DET.
BF
TH/DL
1/2fH
AFC
VCO
HD
X2
-90°
S/H
L.P.F.
1/2
BUFFER
1/2fH
SWD 1/2fH
DSP Ⓨ
PB 5V
JOG Ⓗ (F-11)
VR310
JOG BURST
COMP. SYNC (D-14)
DOP Ⓗ (C-16)
CAM Ⓒ
CAM Ⓨ
RECOERDER SC (E-13)
(PB)
(R-C)
HD (C-5)
VD (C-5)
CG0 (A-8)
CG0 OUT
VD
HD
CLOCK IN
CLOCK OUT
S-CLOCK
CG0-STROBE
S-DATA
CG1-CLOCK
CG1-STROBE
CG1-DATA
IC213
CG0
μPD6145G
MM-200
MIC C.B.A.
SW.
GND
CN1301
Lch
L-BIAS
R-BIAS
Rch
AUDIO 5V
ATT SW 20dB Ⓛ
SW1301
ATT
H.P.F.
VR1301
REC LEVEL
CN1303
GND
Rch (VR OUT)
Rch (VR IN)
Lch (VR IN)
Lch (VR OUT)
GND
MIC
CN1302
GND
Lch
Rch
GND
HEAD-PHONE
HEAD-PHONE C.B.A.
VR051
MUTE
HEAD-PHONES LEVEL
CN051
Lch
Rch
A-MUTE Ⓗ
P ON-MUTE Ⓗ
AUDIO 1 C.B.A.
CN901
Lch
L-BIAS
R-BIAS
Rch
AUDIO 5V
ATT SW 20dB Ⓛ
AUDIO 5V
FADE
LIMITTER
MIC AMP
15KHz L.P.F.
LIMITTER CONTROL
TO PROCESS C.B.A. CN2111
CN902
A-FADE
CN907
GND
Rch (VR OUT)
Rch (VR IN)
Lch (VR IN)
Lch (VR OUT)
GND
MANU.
AUTO
MATRIX
L+R
L-R
GAIN ADJ.
REC Ⓐ
PB Ⓐ
1.5MHz MOD. DE-MOD
1.7MHz MOD. DE-MOD
MONO
POWER MUTE
AUDIO 6V
UNREG 6V
SS 5V
CN903
MONO OUT
Lch
Rch
HEAD SW PULSE
MUTE/MOD. CONTROL
AUDIO 5V
UNREG 6V
MIX
1.5MHz B.P.F.
1.7MHz B.P.F.
CN905
HEAD SW PULSE
A-MUTE Ⓗ
PB Ⓗ /EE Ⓛ
STEREO Ⓗ /MONO. Ⓛ
SS 5V
AV ON Ⓛ
REC REV. AUTO Ⓗ
Lch LEVEL
Rch LEVEL
CN906
UNREG 6V
CN801
REC AFM
PB-RF
TO FUSE BATTERY C.B.A. CN1801
AUDIO 2 C.B.A.
DC AMP
DET
AMP
CN1802
Lch
Rch
A-MUTE Ⓗ
P ON-MUTE Ⓗ
CN1801
Lch
Rch
Rch LEVEL
Lch LEVEL
A-MUTE Ⓗ
P ON-MUTE Ⓗ
CN904
Lch
Rch
Rch LEVEL
Lch LEVEL
A-MUTE Ⓗ
P ON-MUTE Ⓗ
SYSCON-SERVO C.B.A.
A/D CONVERTER
DSP CONTROLLER
MEMORY
D/A CONVERTER
CN1501
Y (DSP OUT)
Y (DSP IN)
C (DSP OUT)
C (DSP IN)
SC
UNREG 6V
ME Ⓗ /MP Ⓛ
HIMP Ⓗ
HEAD SW PULSE
CN1603
JOG VD
S-DATA
S-CLOCK
CG0-STROBE
VIDEO CS
CG1-DATA
CG1-CLOCK
CG1-STROBE
V-MUTE Ⓗ
COMP. SYNC
DISPLAY Ⓛ
H18 Ⓗ /NORM Ⓛ
DSP Ⓗ
PB Ⓗ /EE Ⓛ
CH-1 H-SW PULSE
REC Ⓛ
FE ON Ⓛ
JOG Ⓗ
AV ON Ⓛ
EDIT Ⓛ
SP Ⓗ /LP Ⓛ
CN1604
HEAD SW PULSE
A-MUTE Ⓗ
PB Ⓗ /EE Ⓛ
STEREO Ⓗ /MONO. Ⓛ
SS 5V
AV ON Ⓛ
REC REV. AUTO Ⓗ
Lch LEVEL
Rch LEVEL
CN1611
UNREG 6V
CN1602
UNREG 6V

01 Nov. 1990


7
8
9
10
11
12
13
14
15
16
IC215
TC7S32F
AF FRAME/
CG0 MIX
IC214
TC7SU04F
INV.
IC208
LVA523F2
DSP/NORM.
SW
JOG C.B.A.
IC212
CG1
μPD6144AG
IC213
CG0
μPD6145G
SYSCON-SERVO C.B.A.
CN1501
CN204
CN1603
CN205
CN905
CN1604
CN903
CN906
CN1611
CN801
CN1602
CN804
CN208
IC204
CXL1506
1HDL
IC205
CXL1506
2HDL
IC201
CXA1207Q
VIDEO
IC202
CXA1208Q
CHROMA
IC301
LVC556
(REC)
(PB)
(COMP. S
MATRIX
POWER MUTE
1.5MHz MOD. DE-MOD
1.7MHz MOD. DE-MOD
MIX
1.5MHz B.P.F.
1.7MHz B.P.F.
MUTE/ MOD. CONTROL
AUDIO 6V
A/D CONVERTER
DSP CONTROLLER
MEMORY
D/A CONVERTER
REGULATE CONT.
EXT. BASE DRIVE
VIDEO 5V DRIVE
SYSCON INTER FACE
SYNC SEP
CLAMP
AGC
VCA
4.43MHz TRAP
Y. CORRE DET
LIMITTER
ATT
NOISE CANCELER
MAIN EMPHA
SUB EMPHA
HARD CLIP
FM DE-MODURATER
FM MODURATER
1/2fH SHIFT
DROP OUT DET
RF AGC
CAR CONV.
375fH VCO
VXO XO
90 SHIFT
APC ID
APC DET
ACC DET
ACK BURST ID DET
CHROMA EMPHA
BURST EMPHA
REC CONV
ACK SW
PB CONV
BURST DE-EMPHA
CHAROMA DE-EMPHA
750KHz TRAP
1.5MHz TRAP
TRAP LEVEL DOWN
750KHz B.P.F.
732KHz B.P.F.
4.43MHz B.P.F.
5.17MHz B.P.F.
ME GAIN UP
HEAD SW PULSE
REC AFM
PB-RF



13
14
15
16
17
18
19
20
21
22
IC204
CXL1506
1HDL
IC205
CXL1506
2HDL
IC201
CXA1207Q
VIDEO
IC202
CXA1208Q
CHROMA
CLAMP
VCA
Y. CORRE DET
SYNC
EQ
LIMITTER
ATT
4.43MHz TRAP
MAIN DE-EMPHA
MAIN EMPHA
SUB EMPHA
HARD CLIP
NOISE CANCELER
W/D CLIP
FM DE-MODURATER
FM MODURATER
1/2H SHIFT
W/D CLIP COMP.
L.P.F.
DROP OUT DET
RF AGC
PHASE LEVEL COMP.
PHASE ADJ.
L.P.F. (DL)
(REC)
(PB)
(COMP. SYNC)
Q305
AMP
DIFFERANTIAL
LIMITTER
DARK LEVEL CUT
DYNAMIC APERTURE CIRCUIT
MIX AMP
5MHz TRAP
BUFFER
Hif GAIN DOWN
ME GAIN UP
CAR CONV.
375fH VCO
AFC DET AFC ID
HHK BF GEN
APC ID
VXO XO
90 SHIFT
CAR. INV.
BURST ID FF
ACK BURST ID DET
ACC DET
APC DET
PI-PS
ACC CONT
ACC
CHROMA EMPHA
BURST EMPHA
REC CONV
ACK SW
PB CONV
BURST DE-EMPHA
CHAROMA DE-EMPHA
750KHz TRAP
1.5MHz TRAP
TRAP LEVEL DOWN
TRAP f DOWN
PHASE COMP.
NORM. GAIN DOWN
750KHz B.P.F.
FL306
AMP
Q255
4.43MHz B.P.F.
FL308
732KHz B.P.F.
FL302
Q334
Q333
CN206
PB-RF
CH-1'H-SW PULSE
HEAD SW PULSE
FE ON
REC
REC-RF
CN207
REC ATF
COMP.SYNC
PB-RF (Y)
PB-RF (Y EQ)
HEAD·AMP C.B.A.
CN2
CH-1 HEAD AMP
CH-2 HEAD AMP
OSC
BUFFER
CH-1 REC AMP
CH-2 REC AMP
CH-1' HEAD AMP
CN1
CH-1
CH-2
FE-HEAD
CH-1'
DRUM MOTOR
CH-1 HEAD
FE HEAD
CH-2 HEAD
CH-1 HEAD
VIDEO SUB C.B.A.
ATF IC
200KHz L.P.F.
H18 DET
PEAKING AMP
0.74,1.5MHz TRAP
LIMITTER
TRAP ME:14MHz MP:12MHz
8MHz PEAKING AMP
8.5MHz TRAP
CN1701
CN1702
SEL 1
SEL 2
ATF SW
ATF LOCK
ATF ERROR
TS A
TS B
HEAD SW PULSE
H18 DET
SP/LP
JOG VD
TO SYSCON-SERVO C.B.A. CN103
CN1703
HEAD SW PULSE
PB-RF
FOR SERVICE

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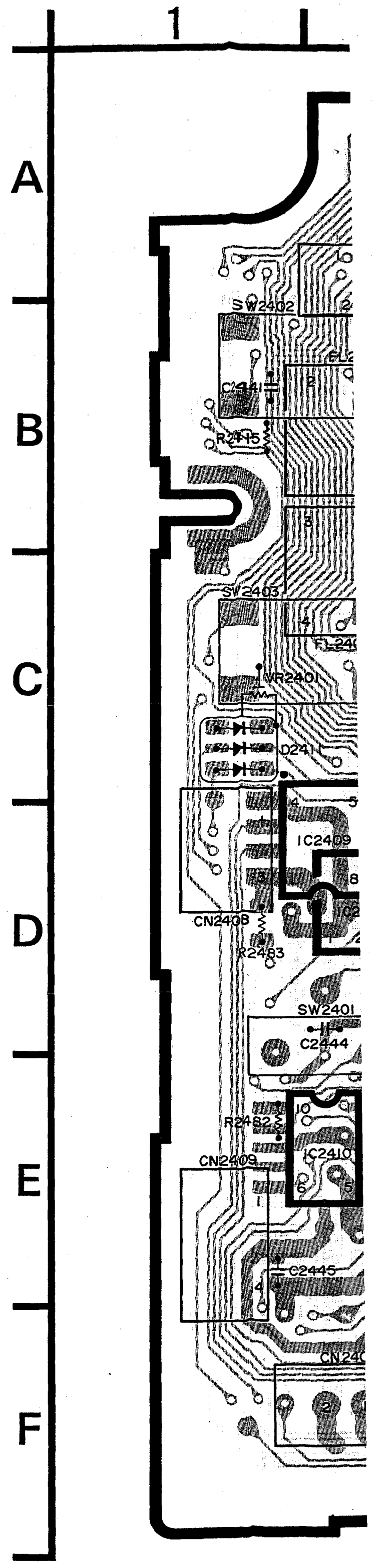
Ⅳ-6

CIRCUIT BOARD DIAGRAM AF

AF–KEY C.B.A.

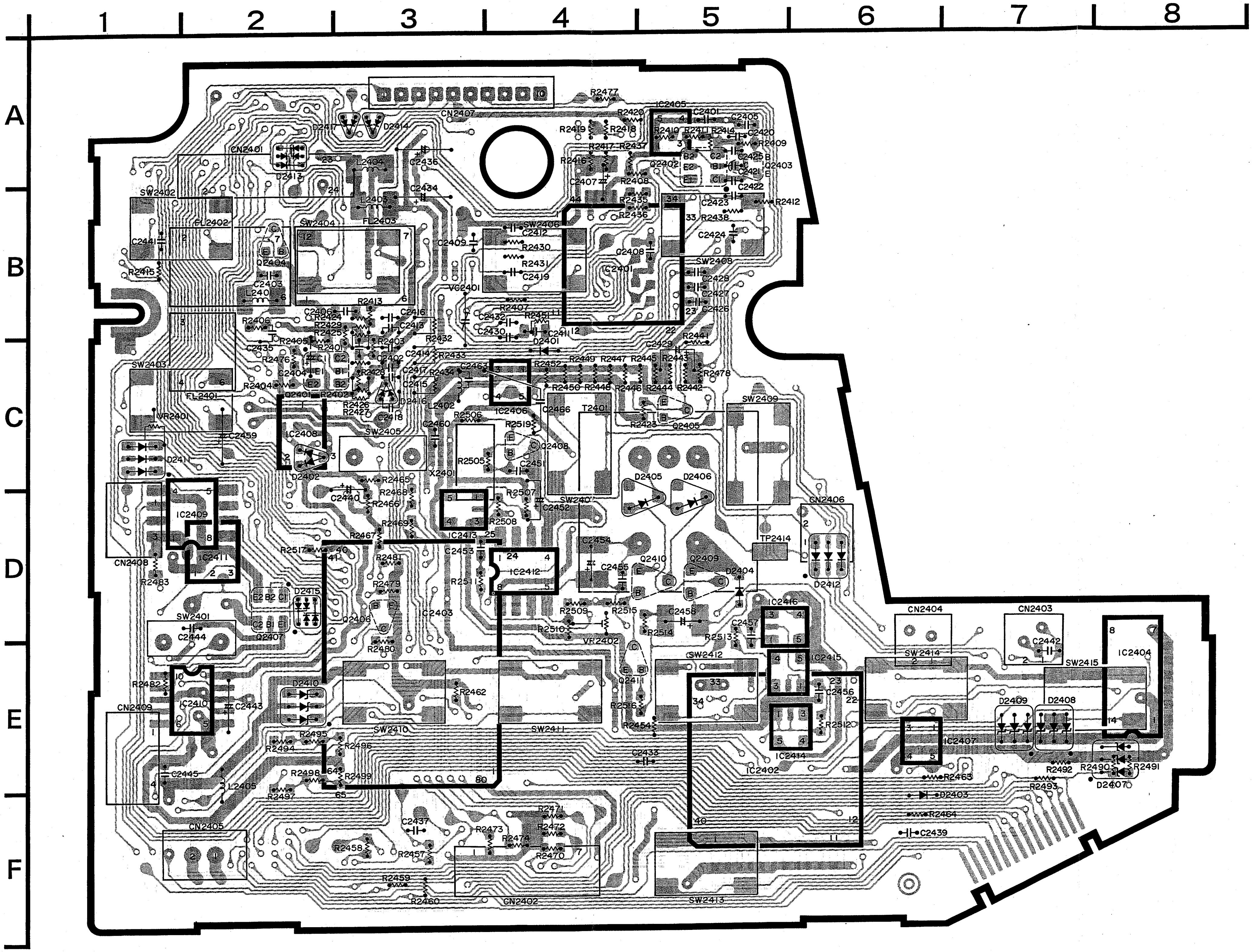
D2401	C–4
D2402	C–2
D2403	E–6
D2404	D–5
D2405	D–5
D2406	D–5
D2407	E–8
D2408	E–7
D2409	E–7
D2410	E–2
D2411	C–1
D2412	D–6
D2413	A–2
D2414	A–3
D2415	D–2
D2416	C–3
D2417	A–3
IC2401	B–4
IC2402	E–5
IC2403	E–3
IC2404	E–8
IC2405	A–5
IC2406	C–4
IC2407	E–6
IC2408	C–2
IC2409	D–2
IC2410	E–2
IC2411	D–2
IC2412	D–4
IC2413	D–3
IC2414	E–6
IC2415	E–5
IC2416	D–5
Q2401	C–2
Q2402	A–5
Q2403	A–5
Q2404	B–2
Q2405	C–5
Q2406	D–3
Q2407	D–2
Q2408	C–4
Q2409	D–5
Q2410	D–5
Q2411	E–4
TP2414	D–5
VC2401	B–3
VR2401	C–1
VR2402	D–4


1
A
B
C
D
E
F
SW2402
C2441
R2415
SW2403
VR2401
D2411
IC2409
CN2408
R2463
SW2401
C2444
R2462
IC2410
CN2409
C2445

CIRCUIT BOARD DIAGRAM AF-KEY C.B.A.

AF-KEY C.B.A.

D2401	C-4
D2402	C-2
D2403	E-6
D2404	D-5
D2405	D-5
D2406	D-5
D2407	E-8
D2408	E-7
D2409	E-7
D2410	E-2
D2411	C-1
D2412	D-6
D2413	A-2
D2414	A-3
D2415	D-2
D2416	C-3
D2417	A-3
IC2401	B-4
IC2402	E-5
IC2403	E-3
IC2404	E-8
IC2405	A-5
IC2406	C-4
IC2407	E-6
IC2408	C-2
IC2409	D-2
IC2410	E-2
IC2411	D-2
IC2412	D-4
IC2413	D-3
IC2414	E-6
IC2415	E-5
IC2416	D-5
Q2401	C-2
Q2402	A-5
Q2403	A-5
Q2404	B-2
Q2405	C-5
Q2406	D-3
Q2407	D-2
Q2408	C-4
Q2409	D-5
Q2410	D-5
Q2411	E-4
TP2414	D-5
VC2401	B-3
VR2401	C-1
VR2402	D-4


1
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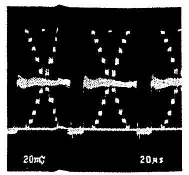
5
6
7
8
A
B
C
D
E
F
CN2407
CN2401
CN2406
CN2408
CN2409
CN2405
CN2404
CN2403
CN2402
SW2402
SW2404
SW2406
SW2408
SW2403
SW2405
SW2409
SW2407
SW2401
SW2410
SW2411
SW2412
SW2413
SW2414
SW2415
FL2402
FL2403
FL2401
IC2401
IC2402
IC2403
IC2404
IC2405
IC2406
IC2407
IC2408
IC2409
IC2410
IC2411
IC2412
IC2413
IC2414
IC2415
IC2416
T2401
X2401
VC2401
VR2401
VR2402
TP2414
L2401
L2402
L2404
L2405
D2401
D2402
D2403
D2404
D2405
D2406
D2407
D2408
D2409
D2410
D2411
D2412
D2413
D2414
D2415
D2416
D2417
Q2401
Q2402
Q2403
Q2404
Q2405
Q2406
Q2407
Q2408
Q2409
Q2410
Q2411

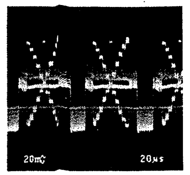
SIGNAL

①



(GRAY SCALE)

②



(GRAY SCALE)

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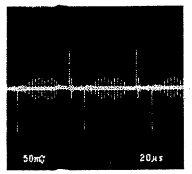
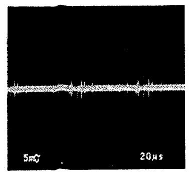


(GRAY SCALE)

④



(GRAY SCALE)

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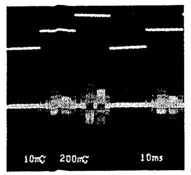
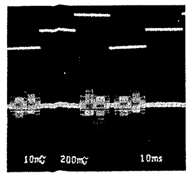


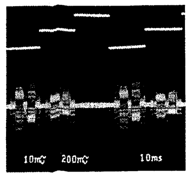
(GRAY SCALE)
TRIG.=IC2401-10pin

⑥



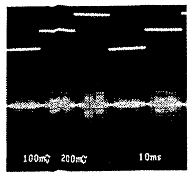
(GRAY SCALE)
TRIG.=IC2401-10pin

⑦

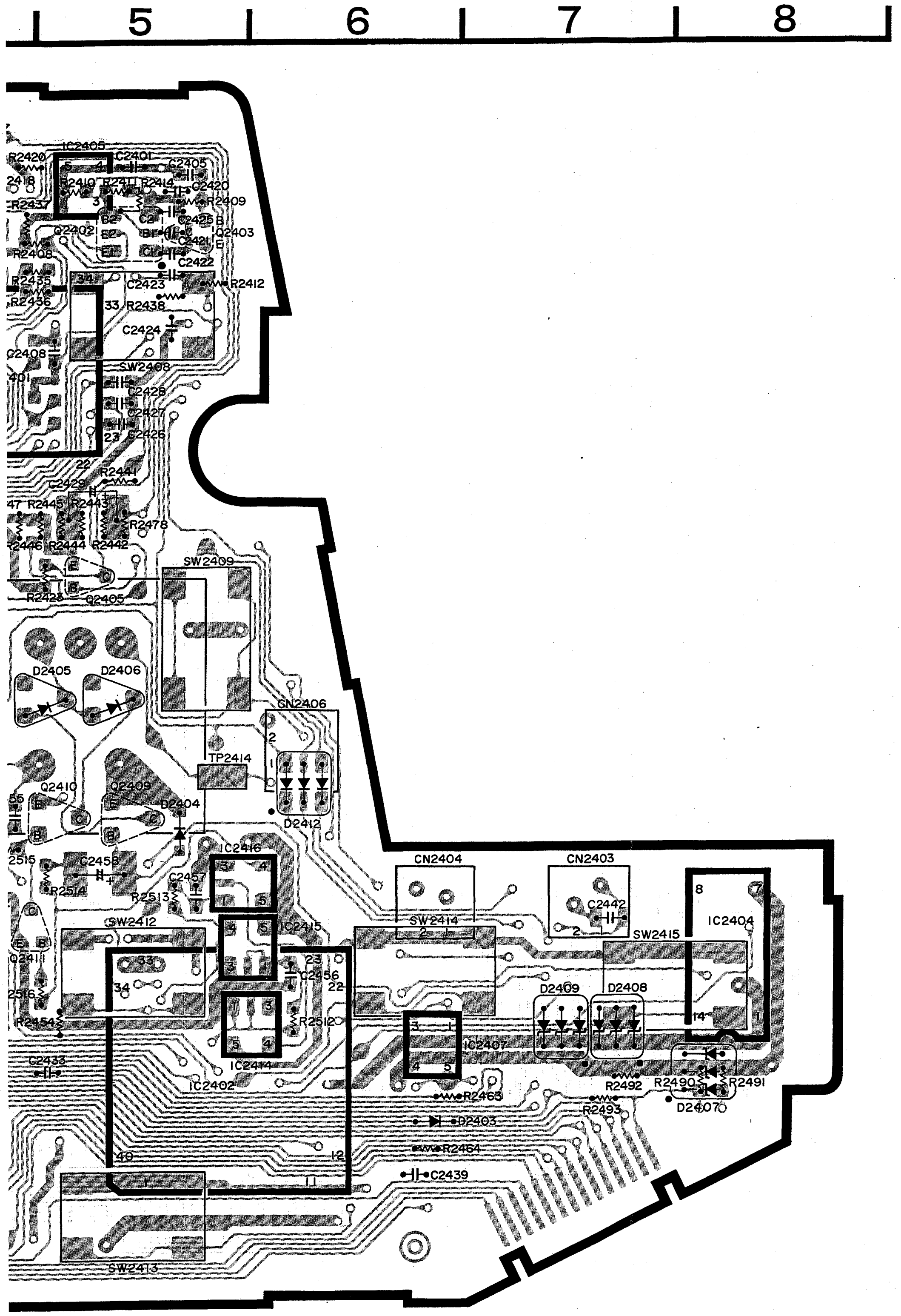


(GRAY SCALE)
TRIG.=IC2401-10pin

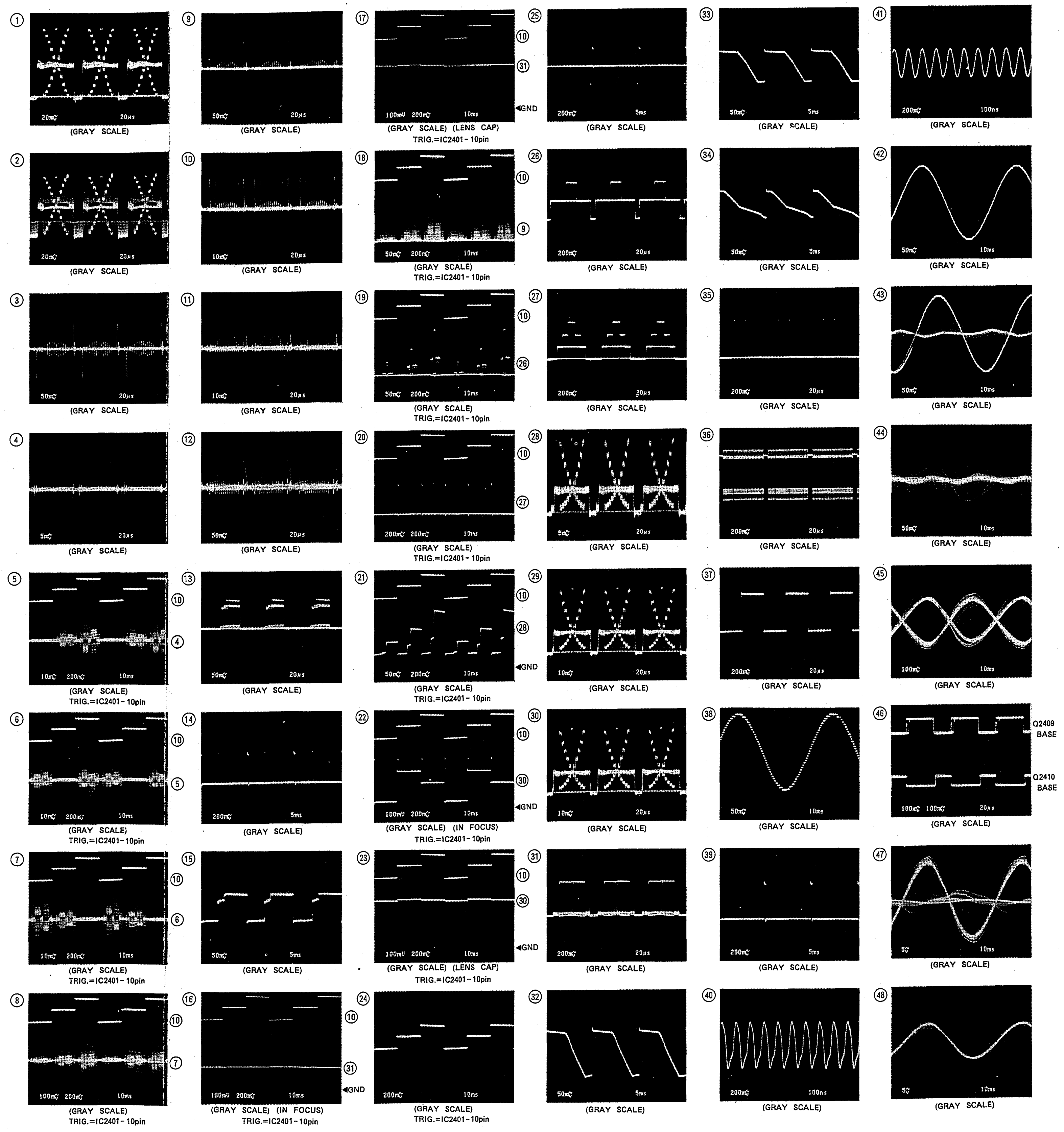
⑧



(GRAY SCALE)
TRIG.=IC2401-10pin


5
6
7
8
IC2405
C2401
C2405
R2420
R2418
R2410
R2411
R2414
C2420
R2409
R2437
Q2402
C2425
Q2403
C2421
R2408
C2422
R2412
R2435
R2436
C2423
R2438
C2424
C2408
SW2408
C2428
C2427
C2426
R2441
C2429
R2445
R2443
R2478
R2446
R2444
R2442
SW2409
R2423
Q2405
D2405
D2406
GN2406
TP2414
Q2410
Q2409
D2404
D2412
IC2416
C2458
C2457
R2514
R2513
CN2404
CN2403
C2442
SW2412
SW2414
SW2415
IC2404
Q2411
IC2415
C2456
R2516
R2454
R2512
D2409
D2408
IC2407
IC2414
C2433
IC2402
R2492
R2490
R2491
R2463
R2493
D2407
D2403
R2464
C2439
SW2413

SIGNAL WAVEFORMS



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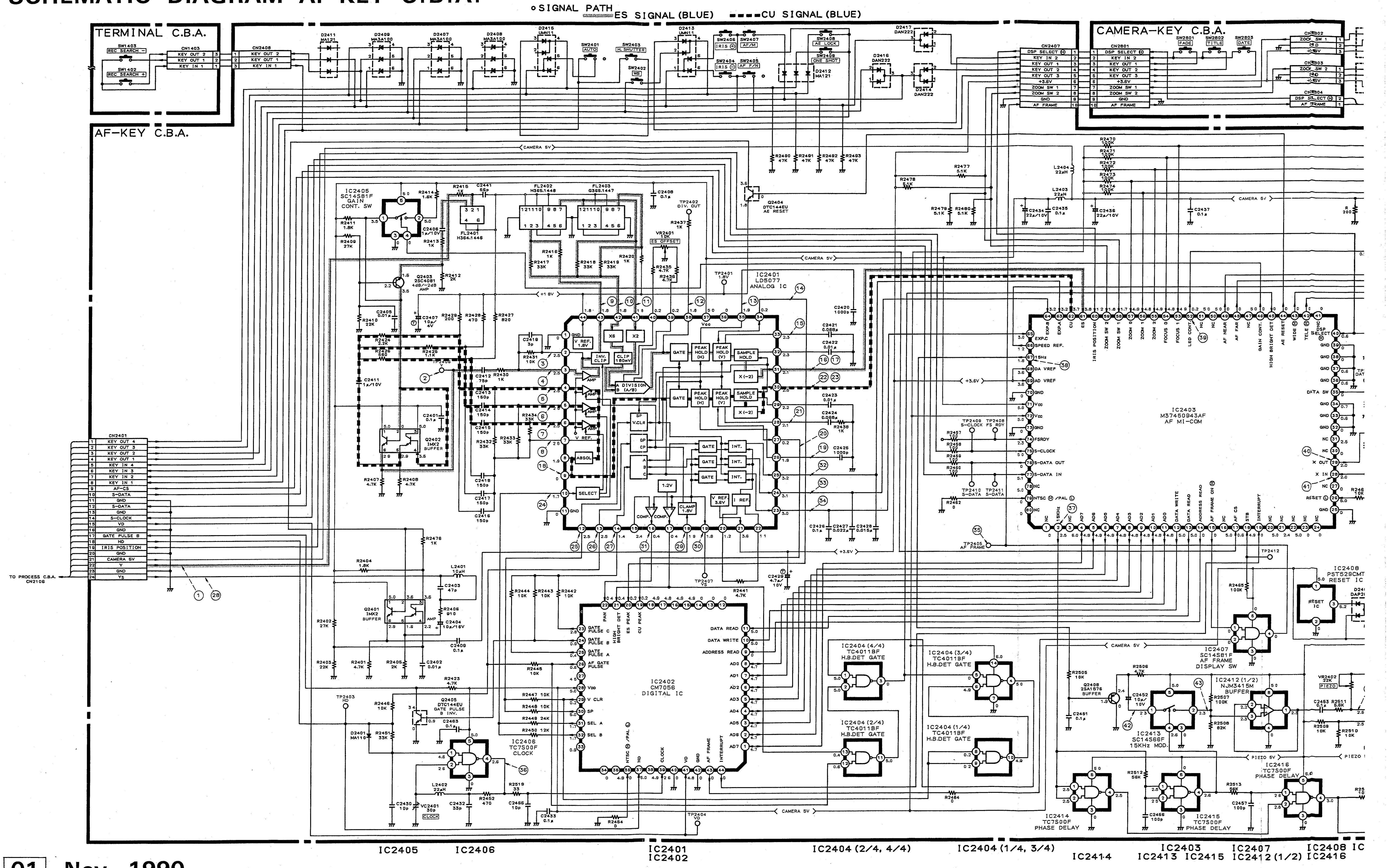
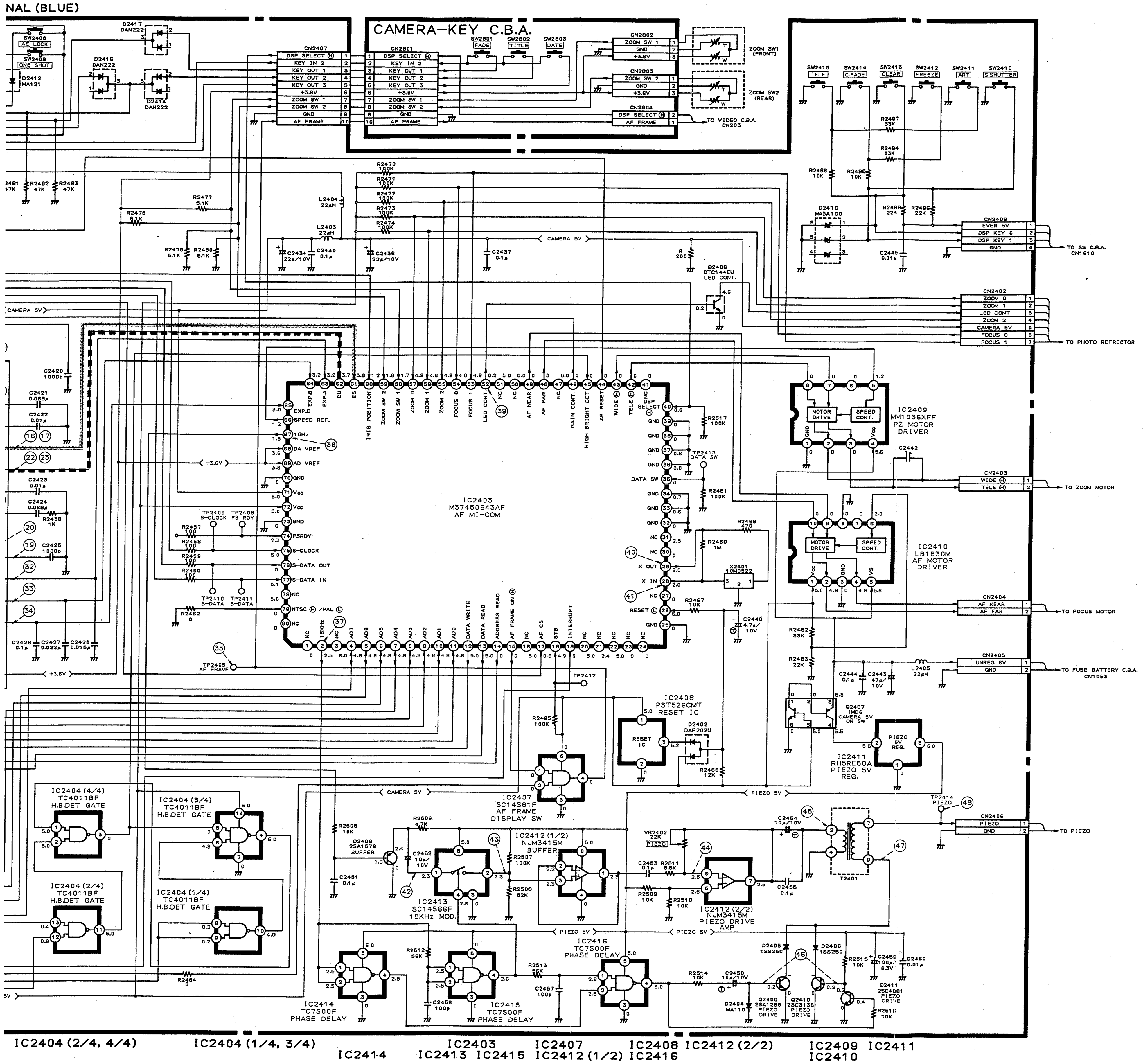
SCHEMATIC DIAGRAM AF-KEY C.B.A.


○SIGNAL PATH
ES SIGNAL (BLUE)
CU SIGNAL (BLUE)
TERMINAL C.B.A.
SW1403 REC SEARCH −
SW1402 REC SEARCH +
CN1403
KEY OUT 2
KEY OUT 1
KEY IN 1
CN2408
D2411 MA121
D2409 MA3A100
D2407 MA3A100
D2408 MA3A100
D2415 UMN11
SW2401 AUTO
SW2403 H. SHUTTER
SW2402 WB
D2413 UMN11
SW2406 IRIS +
SW2407 AF/M
SW2404 IRIS −
SW2405 AF F/N
SW2408 AE LOCK
SW2409 ONE SHOT
D2412 MA121
D2416 DAN222
D2417 DAN222
D2414 DAN222
CN2407
DSP SELECT
KEY IN 2
KEY OUT 1
KEY OUT 2
KEY OUT 3
+3.6V
ZOOM SW 1
ZOOM SW 2
GND
AF FRAME
CAMERA-KEY C.B.A.
CN2801
SW2801 FADE
SW2802 TITLE
SW2803 DATE
CN2802
CN2803
CN2804
AF-KEY C.B.A.
CAMERA 5V
IC2405 SC14S81F GAIN CONT. SW
FL2401 H364.1446
FL2402 H365.1448
FL2403 G365.1447
TP2402 DIV. OUT
VR2401 10K ES OFFSET
Q2403 2SC4081 4dB/−2dB AMP
Q2404 DTC144EU AE RESET
IC2401 LD5077 ANALOG IC
V REF. 1.8V
INV. CLIP
CLIP 180mV
X6
X2
A DIVISION (A/B)
AMP
V REF.
ABSOL
SELECT
GATE
PEAK HOLD (H)
PEAK HOLD (V)
SAMPLE HOLD
X(−2)
SP V.CLR
GP CP
INT.
1.2V
COMP.
CLAMP 1.8V
V REF. 3.5V
I REF.
Q2402 IMX2 BUFFER
TP2401 1.8V
IC2403 M37450943AF AF MI-COM
TP2409 S-CLOCK
TP2408 FS RDY
TP2410 S-DATA
TP2411 S-DATA
TP2405 AF FRAME
TP2412
CN2401
KEY OUT 4
KEY OUT 3
KEY OUT 2
KEY OUT 1
KEY IN 4
KEY IN 3
KEY IN 2
KEY IN 1
AF-CS
S-DATA
GND
S-CLOCK
VD
GATE PULSE B
HD
IRIS POSITION
CAMERA 5V
Y
YS
TO PROCESS C.B.A. CN2106
Q2401 IMX2 BUFFER
L2401 10µH
TP2403 HD
D2401 MA110
Q2405 DTC144EU GATE PULSE B INV.
IC2406 TC7S00F CLOCK
L2402 22µH
VC2401 30p CLOCK
IC2402 CM7056 DIGITAL IC
TP2407 YS
TP2404 VD
DATA READ
DATA WRITE
ADDRESS READ
AD0
AD1
AD2
AD3
AD4
AD5
AD6
AD7
GATE PULSE C
GATE PULSE B
GATE PULSE A
AF GATE PULSE
VDD
V CLR
SP
SEL A
SEL B
IC2404 (4/4) TC4011BF H.B.DET GATE
IC2404 (3/4) TC4011BF H.B.DET GATE
IC2404 (2/4) TC4011BF H.B.DET GATE
IC2404 (1/4) TC4011BF H.B.DET GATE
IC2408 PST529CMT RESET IC
IC2407 SC14S81F AF FRAME DISPLAY SW
Q2406 2SA1576 BUFFER
IC2413 SC14S66F 15KHz MOD.
IC2412 (1/2) NJM3415M BUFFER
VR2402 22K PIEZO
PIEZO 5V
IC2414 TC7S00F PHASE DELAY
IC2415 TC7S00F PHASE DELAY
IC2416 TC7S00F PHASE DELAY
IC2405
IC2406
IC2401 IC2402
IC2404 (2/4, 4/4)
IC2404 (1/4, 3/4)
IC2414
IC2403 IC2413 IC2415
IC2407 IC2412 (1/2)
IC2408 IC2416

01 **Nov. 1990**

VIDE-V05520 / DRUCK 19


NAL (BLUE)
CAMERA-KEY C.B.A.
CN2407
CN2801
CN2802
CN2803
CN2804
DSP SELECT
KEY IN 2
KEY OUT 1
KEY OUT 2
KEY OUT 3
+3.6V
ZOOM SW 1
ZOOM SW 2
GND
AF FRAME
SW2801 FADE
SW2802 TITLE
SW2803 DATE
ZOOM SW1 (FRONT)
ZOOM SW2 (REAR)
TO VIDEO C.B.A. CN203
SW2408 AE LOCK
SW2409 ONE SHOT
D2417 DAN222
D2416 DAN222
D2414 DAN222
D2412 MA121
SW2415 TELE
SW2414 C.FADE
SW2413 CLEAR
SW2412 FREEZE
SW2411 ART
SW2410 S.SHUTTER
D2410 MA3A100
CN2409
EVER 5V
DSP KEY 0
DSP KEY 1
TO SS C.B.A. CN1610
CN2402
ZOOM 0
ZOOM 1
LED CONT
ZOOM 2
CAMERA 5V
FOCUS 0
FOCUS 1
TO PHOTO REFRECTOR
Q2406 DTC144EU LED CONT.
IC2403 M37450943AF AF MI-COM
IC2409 MM1036XFF PZ MOTOR DRIVER
MOTOR DRIVE
SPEED CONT.
CN2403
WIDE
TELE
TO ZOOM MOTOR
IC2410 LB1830M AF MOTOR DRIVER
CN2404
AF NEAR
AF FAR
TO FOCUS MOTOR
CN2405
UNREG 6V
TO FUSE BATTERY C.B.A. CN1953
Q2407 IMD6 CAMERA 5V ON SW
IC2411 RH5RE50A PIEZO 5V REG.
IC2408 PST529CMT RESET IC
D2402 DAP202U
X2401 10M0522
IC2407 SC14S81F AF FRAME DISPLAY SW
TP2412
TP2414 PIEZO
CN2406
PIEZO
TO PIEZO
T2401
IC2404 (4/4) TC4011BF H.B.DET GATE
IC2404 (3/4) TC4011BF H.B.DET GATE
IC2404 (2/4) TC4011BF H.B.DET GATE
IC2404 (1/4) TC4011BF H.B.DET GATE
Q2408 2SA1576 BUFFER
IC2413 SC14S66F 15KHz MOD.
IC2412 (1/2) NJM3415M BUFFER
IC2412 (2/2) NJM3415M PIEZO DRIVE AMP
IC2414 TC7S00F PHASE DELAY
IC2415 TC7S00F PHASE DELAY
IC2416 TC7S00F PHASE DELAY
Q2409 2SA1255 PIEZO DRIVE
Q2410 2SC3138 PIEZO DRIVE
Q2411 2SC4081 PIEZO DRIVE
D2404 MA110
D2405 1SS250
D2406 1SS250
VR2402 22K PIEZO
TP2405 AF FRAME
TP2409 S-CLOCK
TP2408 FS RDY
TP2410 S-DATA
TP2411 S-DATA
TP2413 DATA SW
CAMERA 5V
+3.6V
PIEZO 5V
IC2404 (2/4, 4/4)
IC2404 (1/4, 3/4)
IC2414
IC2403
IC2413 IC2415
IC2407
IC2412 (1/2)
IC2408
IC2416
IC2412 (2/2)
IC2409 IC2411
IC2410

FRECTOR

OR

TOR

ERY C.B.A.

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CIRCUIT BOARD DIAGRAM PROCESS C.B.A.

< NOTICE >

PROCESS C.B.A. consists of four layers.
(Soldering, Component, Power Supply and Ground patterns.)

※ Through-hole marks on each C. B. A. denote :

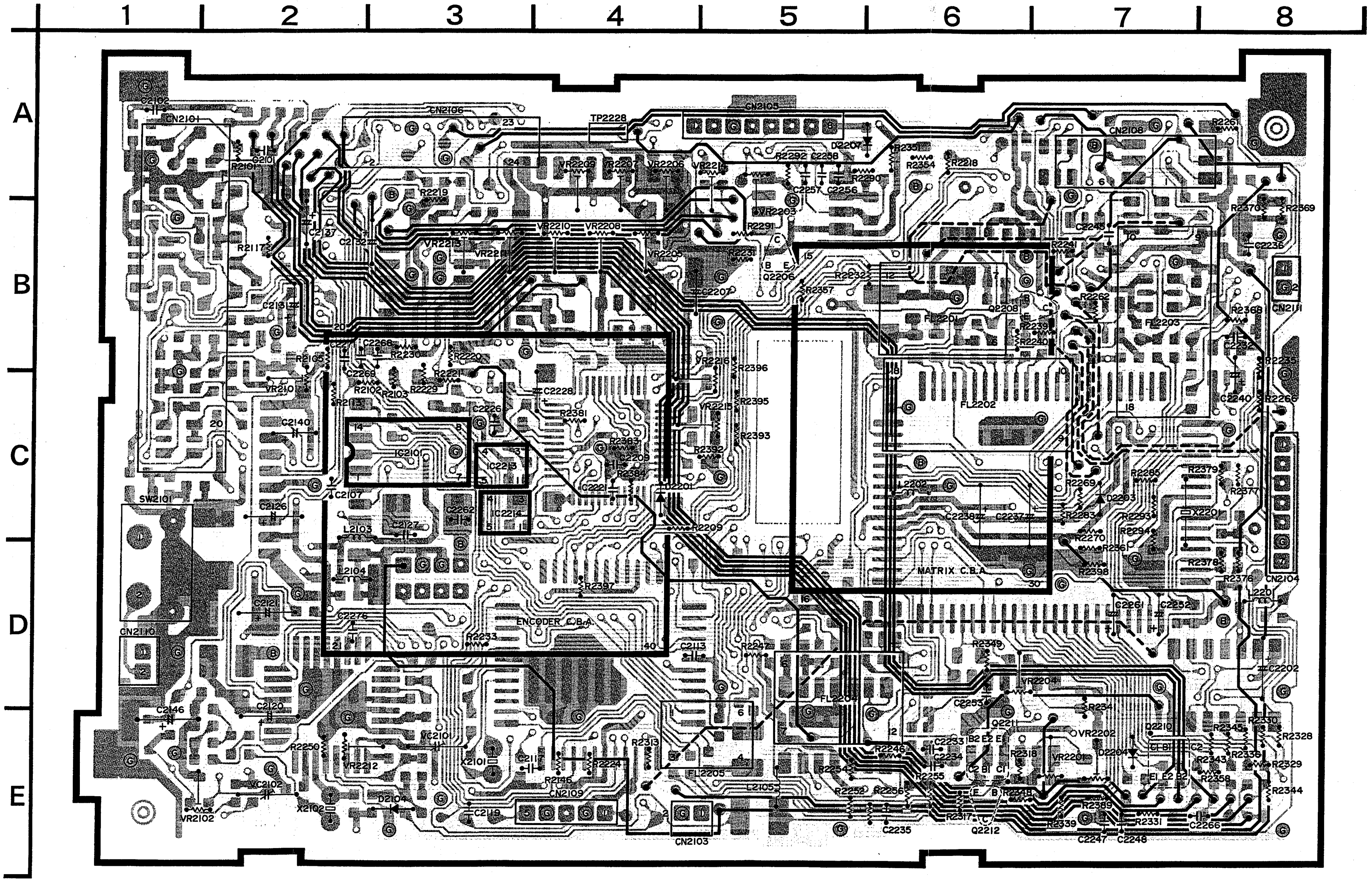
○ : Soldering side ⟷ Component side
Ⓖ : Soldering side (Component side) ⟷ Ground
Ⓑ : Soldering side (Component side) ⟷ Power Supply

And, blue lines denote signal patterns which connected in the Ground or Power Supply layer.

Blue (————) : Power Supply layer
Blue (- - - -) : Ground layer

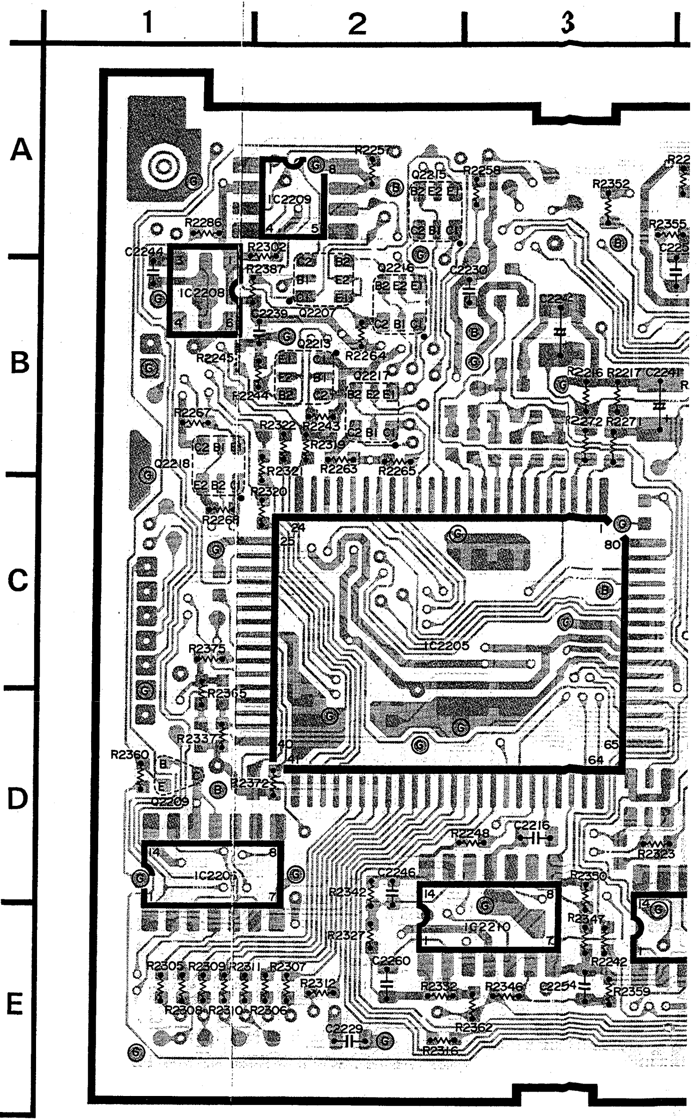
PROCESS C.B.A. (COMPONENT SIDE)

D2104	E−3
D2201	C−4
D2203	C−7
D2204	E−7
D2207	A−6
IC2101	C−3
IC2213	C−3
IC2214	C−3
Q2206	B−5
Q2208	B−7
Q2210	E−7
Q2211	E−6
Q2212	E−6
TP2228	A−4
VC2101	E−3
VC2102	E−2
VR2101	C−2
VR2102	E−2
VR2201	E−7
VR2202	E−7
VR2203	A−5
VR2204	D−6
VR2205	B−4
VR2206	A−4
VR2207	A−4
VR2208	B−4
VR2209	A−4
VR2210	B−4
VR2211	B−3
VR2212	E−2
VR2213	B−3
VR2214	A−5
VR2215	C−5
VR2216	C−4


1
2
3
4
5
6
7
8
A
B
C
D
E
CN2101
CN2106
TP2228
CN3105
D2207
CN2108
IC2101
IC2213
IC2214
FL2201
FL2202
IC2201
MATRIX C.B.A.
ENCODER C.B.A.
SW2101
CN2110
CN2104
CN2111
L2103
L2104
FL2204
FL2205
CN2109
CN2103
VR2102
VR2210
VR2208
VR2212
VR2201
VR2202
Q2212
Q2210
Q2211
C2235
C2247
C2248
C2266

PROCESS C.B.A. (SOLDERING SIDE)

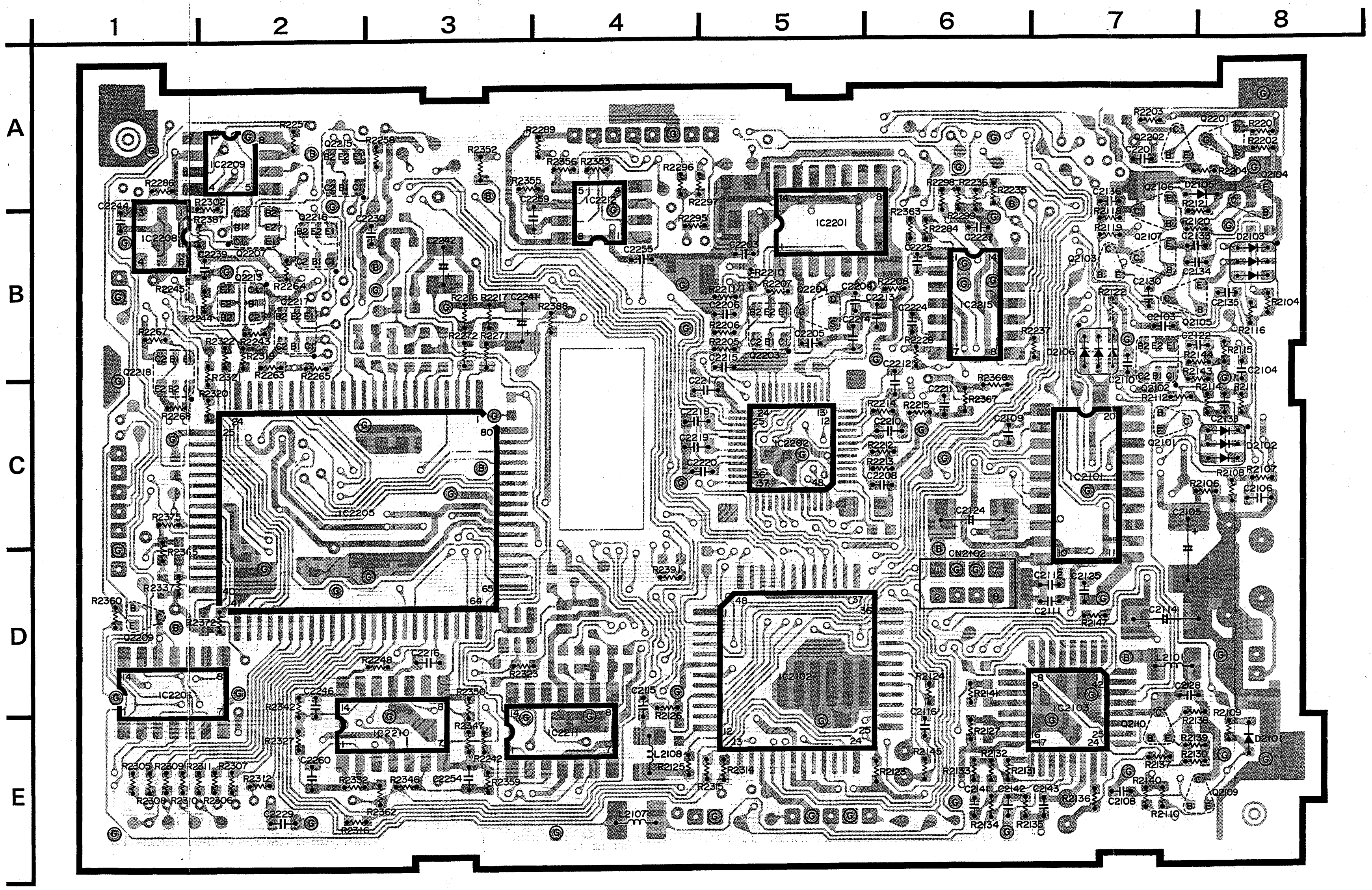
D2101	E−8
D2102	C−8
D2103	B−8
D2105	A−8
D2106	B−7
IC2101	C−7
IC2102	D−5
IC2103	E−7
IC2201	B−5
IC2202	C−5
IC2205	C−2
IC2206	D−1
IC2208	B−1
IC2209	A−2
IC2210	E−3
IC2211	E−4
IC2212	B−4
IC2215	B−6
Q2101	C−7
Q2102	B−7
Q2103	B−7
Q2104	A−8
Q2105	B−7
Q2106	B−7
Q2107	B−7
Q2109	E−8
Q2110	E−7
Q2201	A−8
Q2202	A−7
Q2203	B−5
Q2204	B−5
Q2207	B−2
Q2209	D−1
Q2213	B−2
Q2215	A−2
Q2216	B−2
Q2217	B−2
Q2218	B−1


1
2
3
A
B
C
D
E
IC2209
IC2208
IC2205
IC2206
IC2210
R2360
R2305
R2362
C2260
C2229

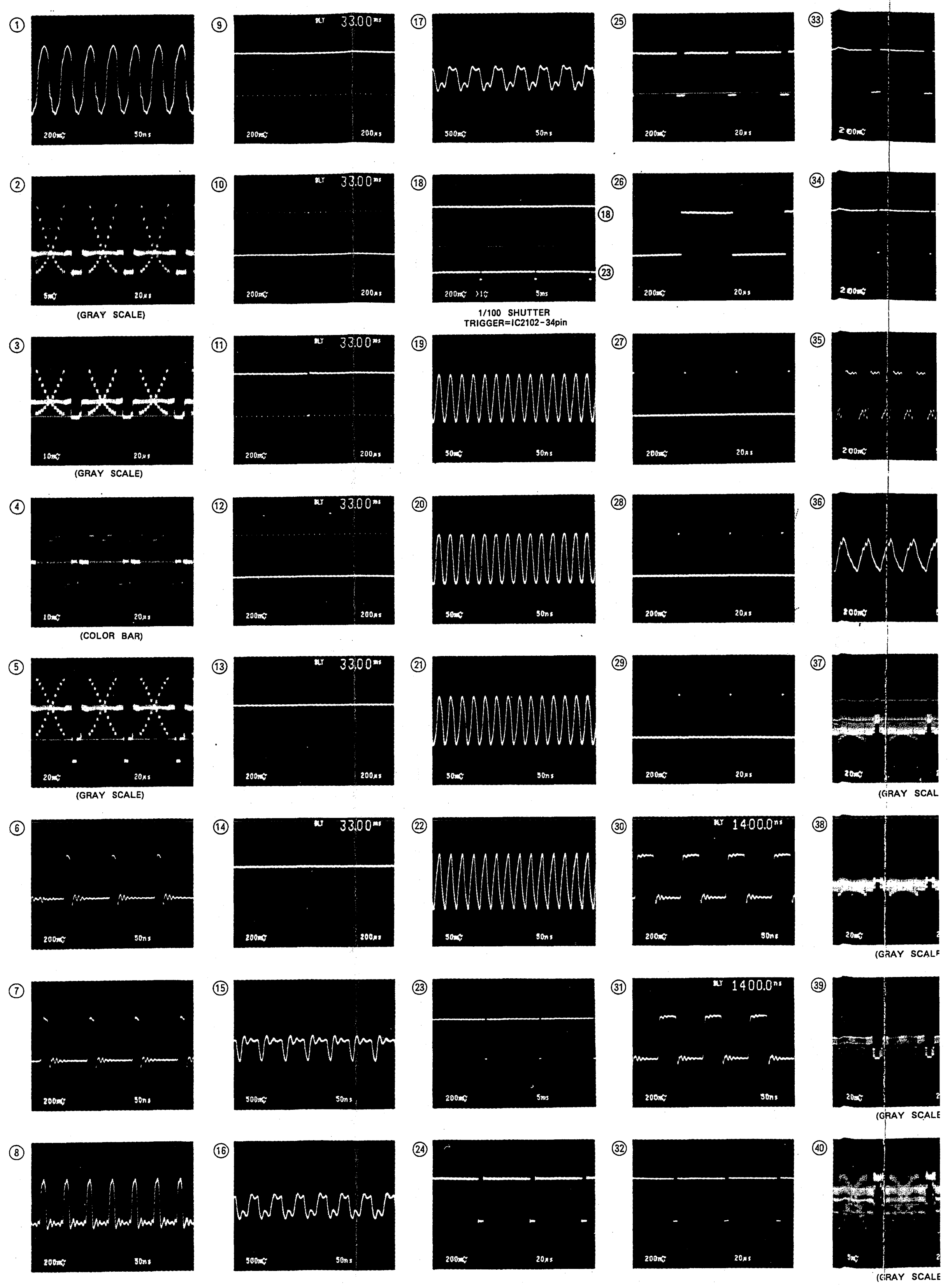
ıts of four layers.
Power Supply and Ground patterns.)
ı each C. B. A. denote :
Component side
mponent side) ⟷ Ground
mponent side) ⟷ Power Supply
signal patterns which connected in the
y layer.
: Power Supply layer
: Ground layer

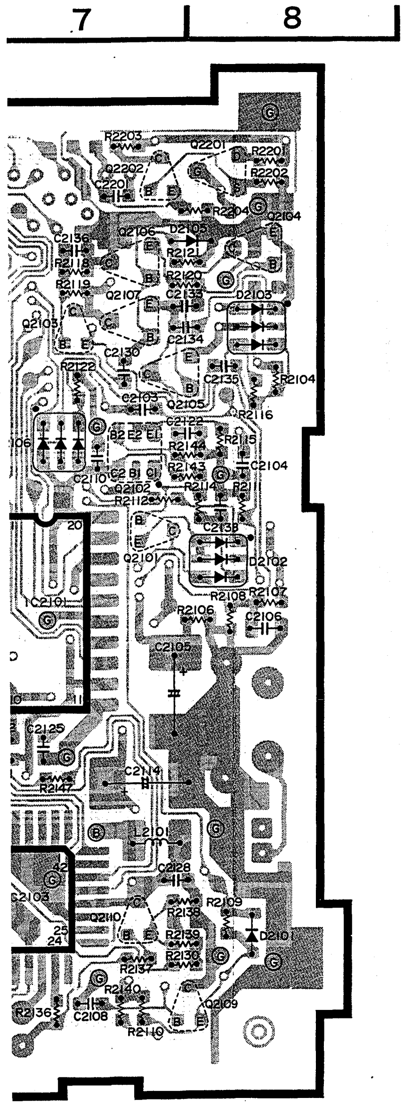
ESS C.B.A. (SOLDERING SIDE)

1	E−8
2	C−8
3	B−8
5	A−8
6	B−7
1	C−7
2	D−5
3	E−7
1	B−5
2	C−5
5	C−2
6	D−1
8	B−1
9	A−2
0	E−3
1	E−4
2	B−4
5	B−6
1	C−7
2	B−7
3	B−7
4	A−8
5	B−7
6	B−7
7	B−7
9	E−8
0	E−7
1	A−8
2	A−7
3	B−5
4	B−5
7	B−2
9	D−1
3	B−2
5	A−2
6	B−2
7	B−2
8	B−1

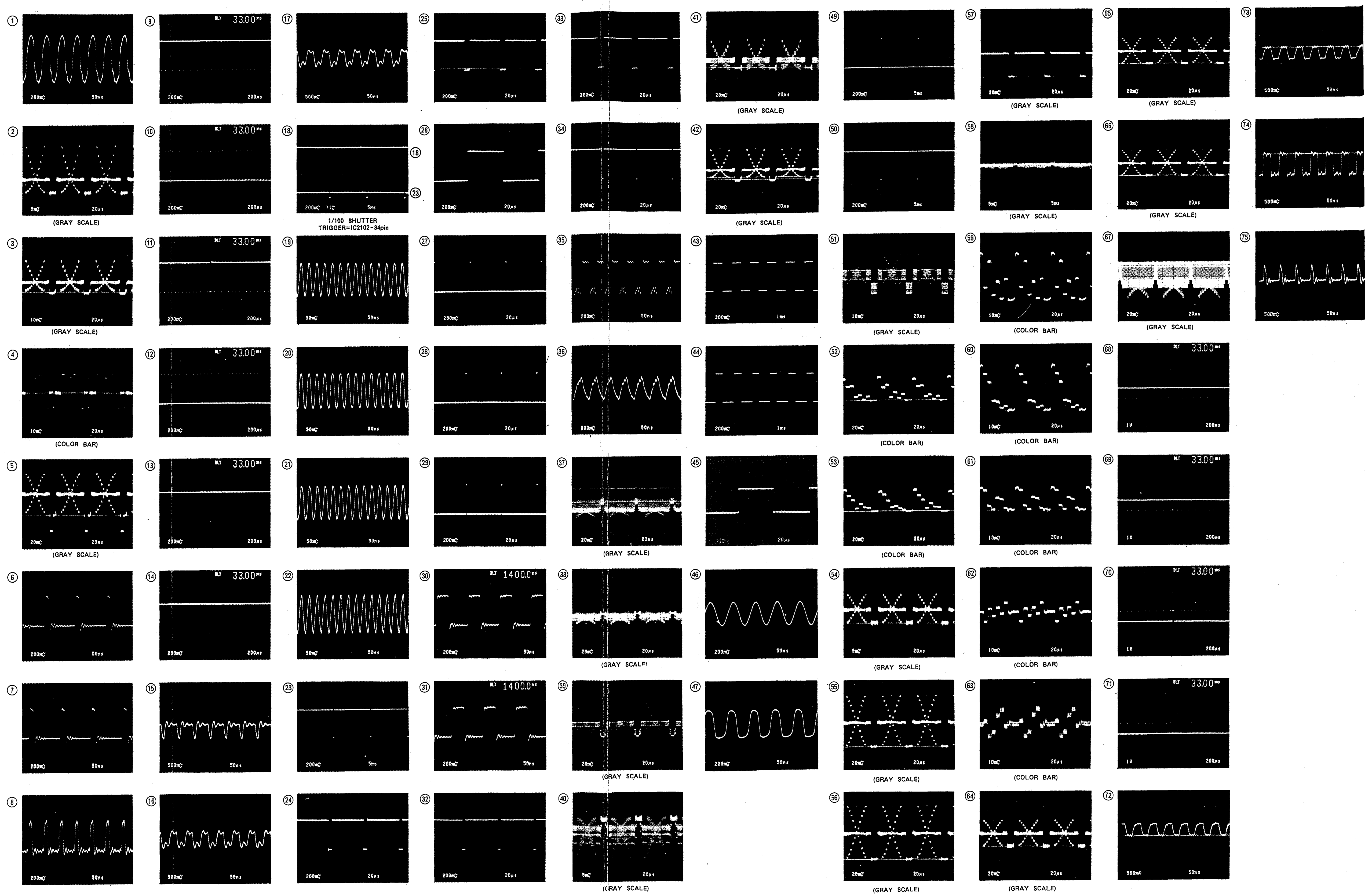

1
2
3
4
5
6
7
8
A
B
C
D
E
IC2209
IC2206
IC2212
IC2201
IC2215
IC2205
IC2202
IC2101
IC2102
IC2103
IC2208
IC2210
IC2211
CN2102
L2108
L2107
L2101

SIGNAL WAVEFORMS




7
8
R2203
Q2201
R2201
R2202
Q2202
C2104
C2136
Q2106
R2204
R2121
R2120
Q2107
C2133
Q2103
C2134
C2130
R2122
C2135
R2104
R2116
R2115
C2104
IC2101
C2102
R2108
R2106
C2105
R2107
C2106
C2125
C2114
L2101
C2128
R2109
D2101
R2136
C2108
R2110
Q2109

SIGNAL WAVEFORMS



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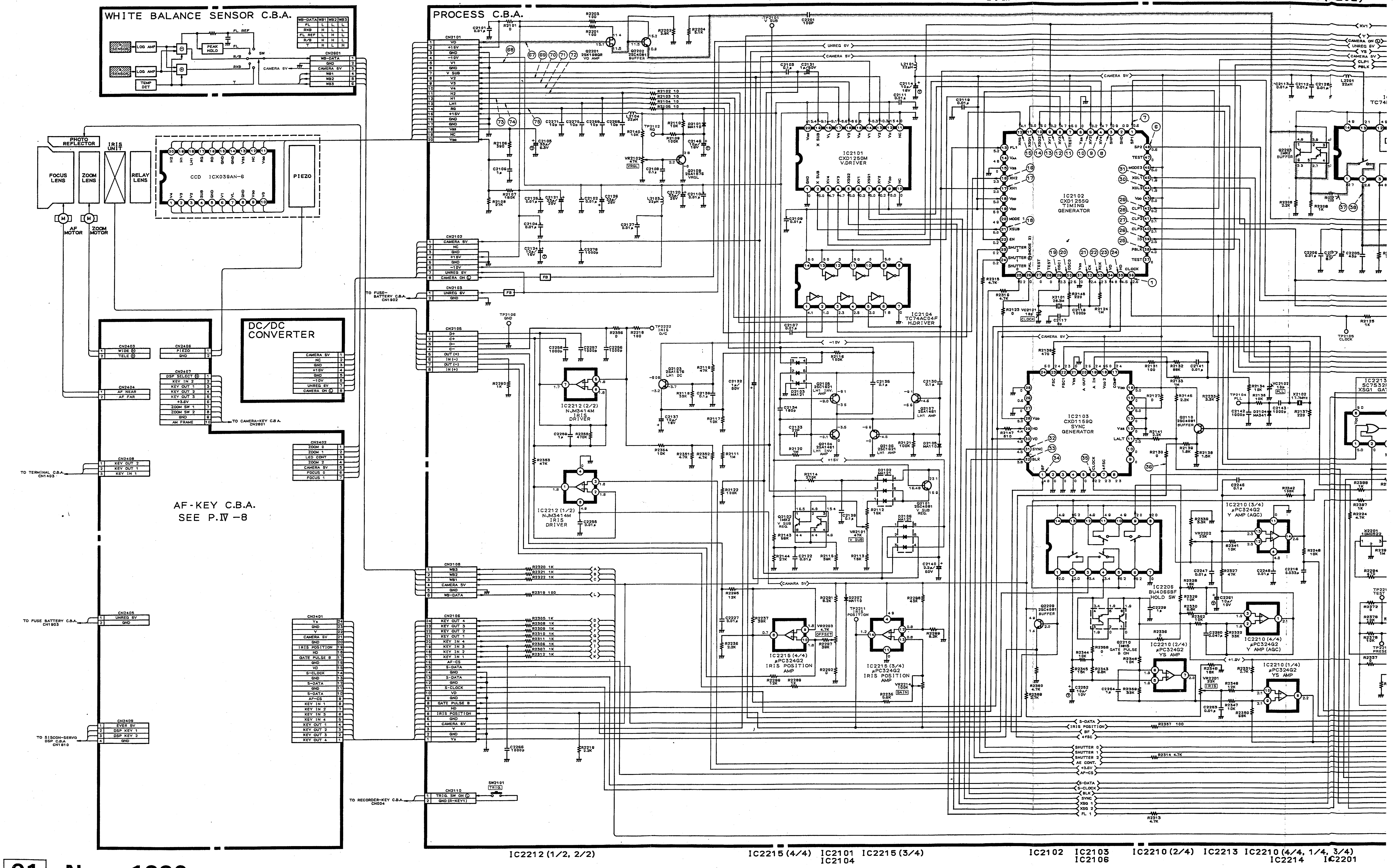
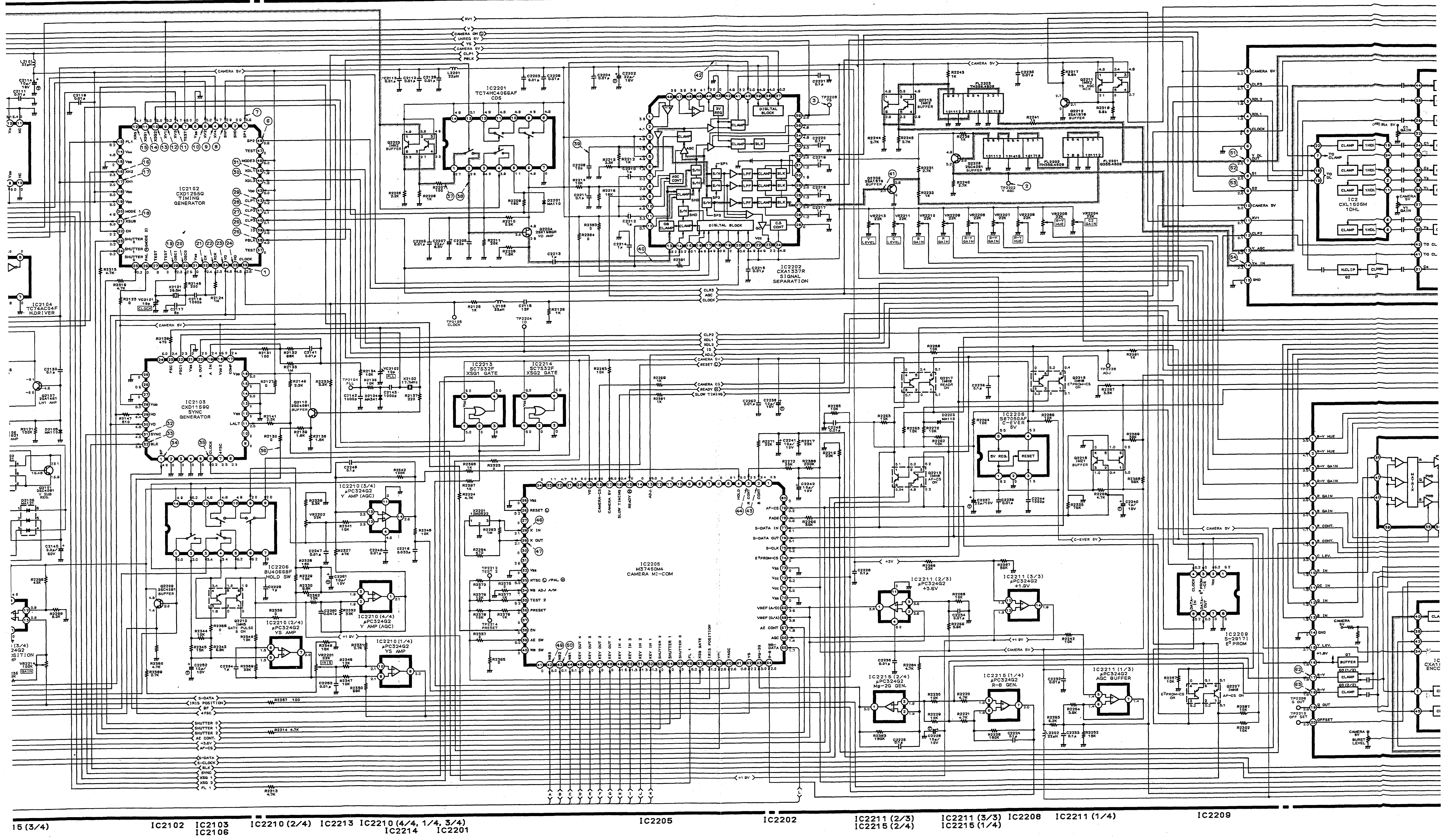
SCHEMATIC DIAGRAM PROCESS C.B.A.

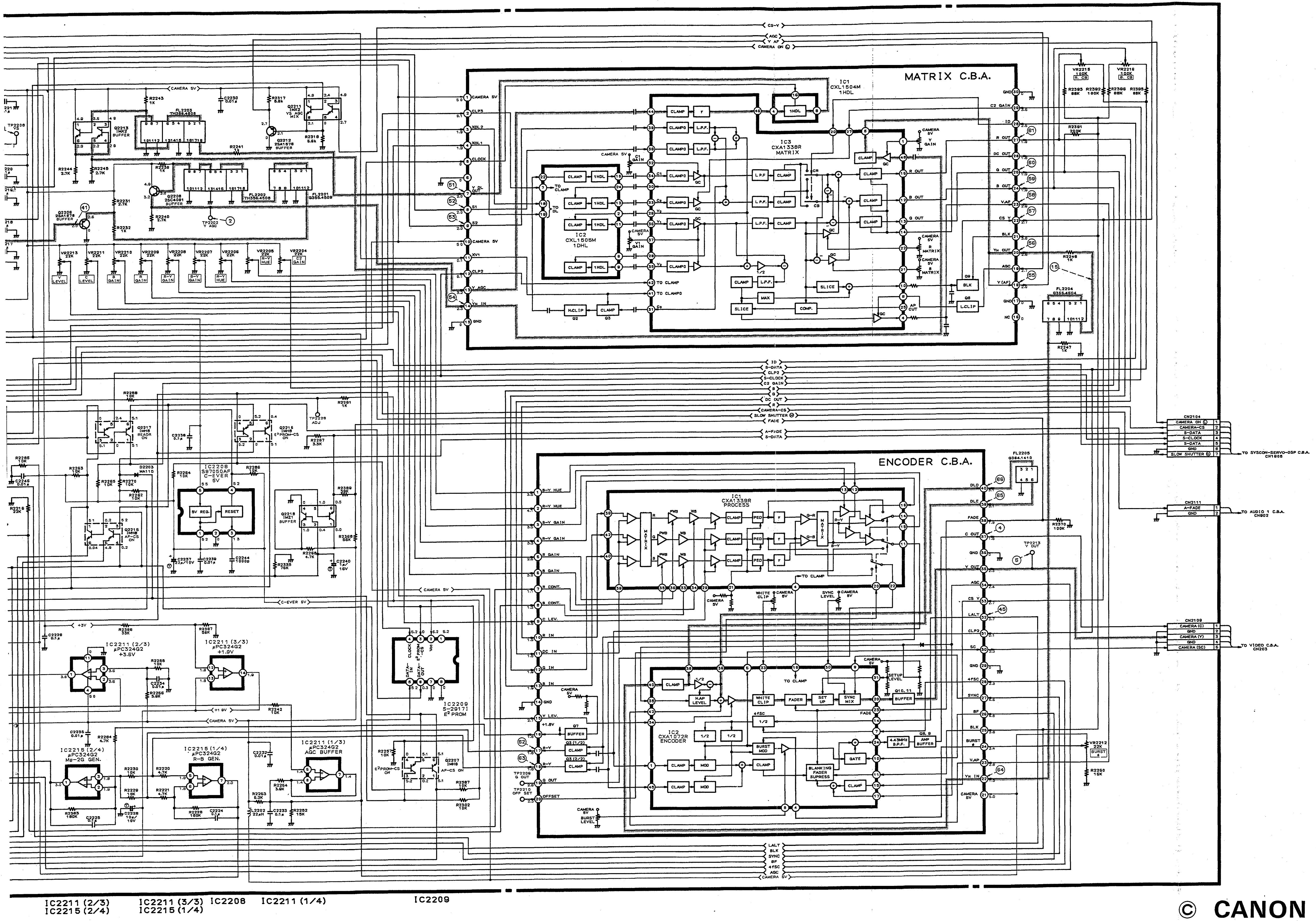
○SIGNAL PATH ═ Y+C SIGNAL (GRAY) ═ Y SIGNAL (BLUE)



WHITE BALANCE SENSOR C.B.A.
PROCESS C.B.A.
PHOTO REFLECTOR
IRIS UNIT
FOCUS LENS
ZOOM LENS
RELAY LENS
AF MOTOR
ZOOM MOTOR
CCD ICX039AN-6
PIEZO
DC/DC CONVERTER
AF-KEY C.B.A.
SEE P.Ⅳ-8
TO TERMINAL C.B.A. CN1403
TO FUSE BATTERY C.B.A. CN1903
TO SISCON-SERVO DSP C.B.A. CN1610
TO FUSE-BATTERY C.B.A. CN1902
TO CAMERA-KEY C.B.A. CN2801
TO RECORDER-KEY C.B.A. CN004
IC2101 CXD1250M V.DRIVER
IC2104 TC74AC04F H.DRIVER
IC2102 CXD1255Q TIMING GENERATOR
IC2103 CXD1159Q SYNC GENERATOR
IC2212 (2/2) NJM3414M IRIS DRIVER
IC2212 (1/2) NJM3414M IRIS DRIVER
IC2215 (4/4) μPC324G2 IRIS POSITION AMP
IC2215 (3/4) μPC324G2 IRIS POSITION AMP
IC2208 BU4066BF HOLD SW
IC2210 (3/4) μPC324G2 Y AMP (AGC)
IC2210 (4/4) μPC324G2 Y AMP (AGC)
IC2210 (2/4) μPC324G2 YS AMP
IC2210 (1/4) μPC324G2 YS AMP
IC2212 (1/2, 2/2)
IC2215 (4/4)
IC2101
IC2104
IC2215 (3/4)
IC2102
IC2103
IC2106
IC2210 (2/4)
IC2213
IC2210 (4/4, 1/4, 3/4)
IC2214
IC2201

∘SIGNAL PATH ═ Y+C SIGNAL (GRAY) ═ Y SIGNAL (BLUE) C SIGNAL (ORANGE)


IC2102 CXD1255Q TIMING GENERATOR
IC2103 CXD1159Q SYNC GENERATOR
IC2104 TC74AC04F H.DRIVER
IC2201 TC74HC4066AF CDS
IC2202 CXA1337R SIGNAL SEPARATION
IC2205 M37450M4 CAMERA MI-COM
IC2206 BU4066BF HOLD SW
IC2208 S8705AF C-EVER 5V
IC2209 S-2917I E² PROM
IC2210 (1/4) μPC324G2 YS AMP
IC2210 (2/4) μPC324G2 YS AMP
IC2210 (3/4) μPC324G2 Y AMP (AGC)
IC2210 (4/4) μPC324G2 Y AMP (AGC)
IC2211 (1/3) μPC324G2 AGC BUFFER
IC2211 (2/3) μPC324G2 +3.6V
IC2211 (3/3) μPC324G2 +1.9V
IC2213 SC7S32F XSG1 GATE
IC2214 SC7S32F XSG2 GATE
IC2215 (1/4) μPC324G2 R-B GEN.
IC2215 (2/4) μPC324G2 Mg-2G GEN.
IC2 CXL1505M 1DHL
15 (3/4)
IC2102
IC2103
IC2106
IC2210 (2/4)
IC2213
IC2210 (4/4, 1/4, 3/4)
IC2214
IC2201
IC2205
IC2202
IC2211 (2/3)
IC2215 (2/4)
IC2211 (3/3)
IC2215 (1/4)
IC2208
IC2211 (1/4)
IC2209


MATRIX C.B.A.
IC1 CXL1504M 1HDL
IC2 CXL1505M 1DHL
IC3 CXA1338R MATRIX
ENCODER C.B.A.
IC1 CXA1339R PROCESS
IC2 CXA1072R ENCODER
IC2208 S8705AF C-EVER 5V
IC2209 S-2917I E² PROM
IC2211 (2/3) μPC324G2 +3.6V
IC2211 (3/3) μPC324G2 +1.9V
IC2211 (1/3) μPC324G2 AGC BUFFER
IC2215 (2/4) μPC324G2 Mg-2G GEN.
IC2215 (1/4) μPC324G2 R-B GEN.
FL2201 G356.4509
FL2202 TH356.4508
FL2203 TH356.4508
FL2204 G356.4504
FL2205 G364.1410
CN2104
TO SYSCON-SERVO-DSP C.B.A. CN1808
CN2111
TO AUDIO 1 C.B.A. CN802
CN2109
TO VIDEO C.B.A. CN203
IC2211 (2/3)
IC2215 (2/4)
IC2211 (3/3)
IC2215 (1/4)
IC2208
IC2211 (1/4)
IC2209

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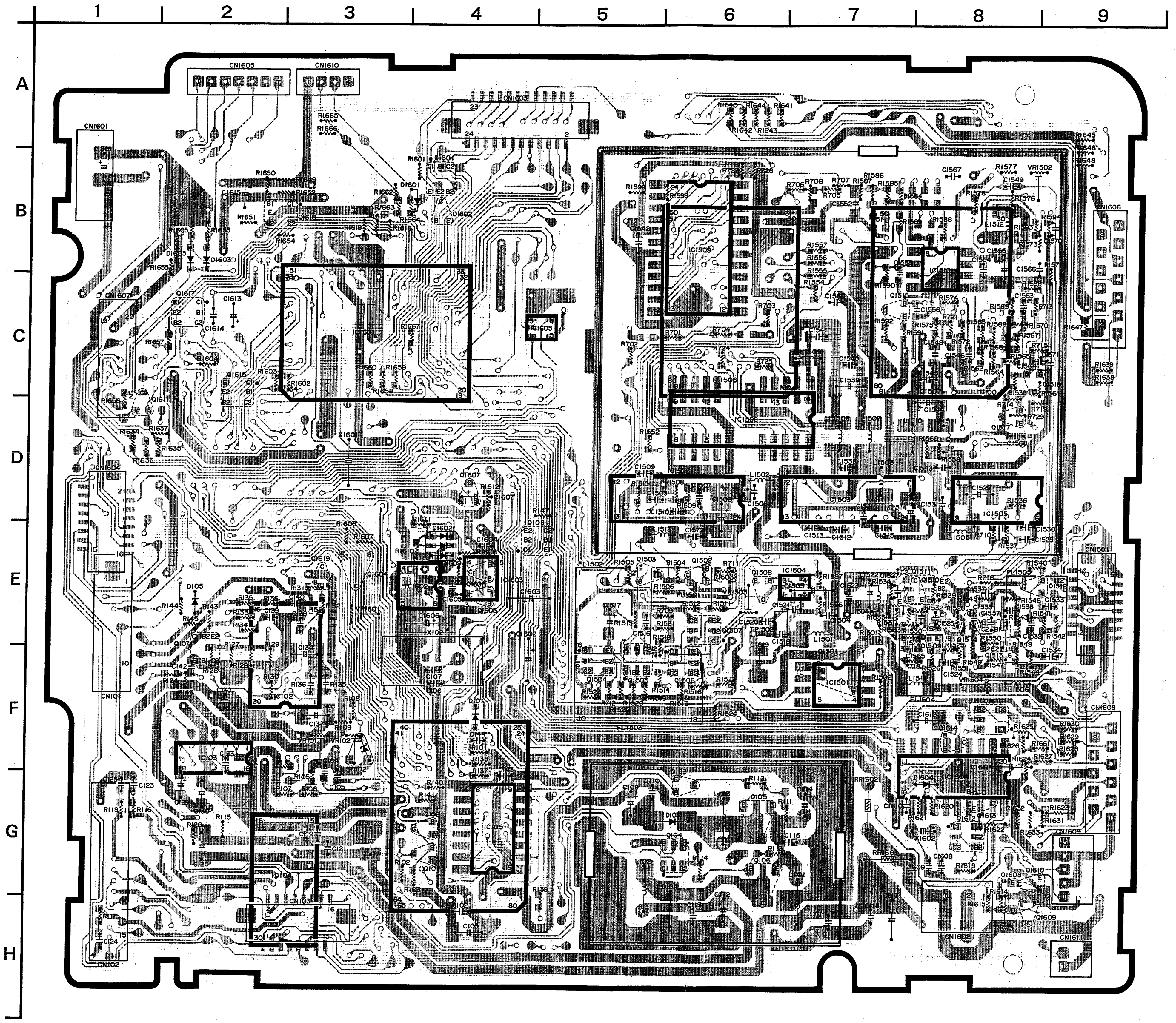
CIRCUIT BOARD DIAGRAM SYSCON-SERVO • RECORDER-KEY (1) C.B.A.

SYSCON-SERVO C.B.A.(COMPONENT SIDE)

D101	F-4
D102	F-3
D103	G-6
D104	G-6
D105	E-2
D1601	B-4
D1602	E-4
D1603	B-2
D1604	G-8
D1605	B-2
IC101	G-4
IC102	F-3
IC103	F-2
IC104	G-3
IC105	G-4
IC1501	F-7
IC1502	D-6
IC1503	D-7
IC1504	E-7
IC1505	D-8
IC1506	C-6
IC1507	C-8
IC1508	D-6
IC1509	B-6
IC1510	B-8
IC1601	C-3
IC1602	E-4
IC1603	E-4
IC1604	G-8
IC1605	C-5
Q101	G-4
Q102	G-4
Q103	G-6
Q104	G-6
Q105	G-6
Q106	G-6
Q107	F-2
Q108	E-5
Q1501	F-7
Q1502	E-6
Q1503	E-5
Q1504	F-5
Q1505	F-5
Q1506	F-6
Q1507	E-6
Q1508	E-6
Q1509	E-8
Q1510	E-8
Q1511	E-8
Q1512	E-9
Q1513	E-8
Q1514	E-8
Q1515	C-7
Q1517	D-8
Q1518	C-8
Q1601	B-4
Q1602	B-4
Q1604	E-3
Q1605	E-4
Q1606	E-4
Q1607	D-4
Q1608	G-8
Q1609	H-8
Q1610	G-8
Q1611	D-1
Q1612	G-8
Q1613	G-8
Q1614	F-8
Q1615	C-2
Q1616	F-8
Q1617	C-2
Q1618	B-3
Q1619	E-3
TP1502	E-6
VR101	F-3
VR102	F-3
VR1502	B-8
VR1503	E-6
VR1504	F-8
VR1601	E-3


1
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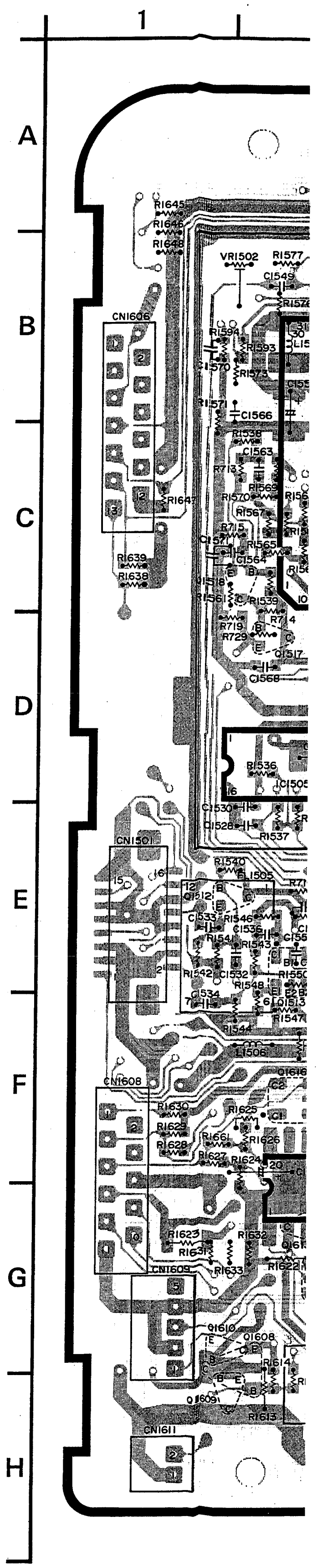
7
8
9
A
B
C
D
E
F
G
H
CN1605
CN1610
CN1603
CN1601
CN1607
CN1604
CN101
CN102
CN1606
CN1501
CN1608
CN1609
CN1602
CN1611
IC1601
IC1605
IC1509
IC1510
IC1506
IC1508
IC1502
IC1503
IC1505
IC1504
IC1501
IC1602
IC1603
IC1604
IC101
IC102
IC103
IC104
IC105
X1601
X1602
FL1501
FL1502
FL1503
FL1504

SYSCON-SERVO C.B.A.

D101	F-6
D102	F-7
D103	G-4
D104	G-4
D105	E-8
D1601	B-6
D1602	E-6
D1603	B-8
D1604	G-2
D1605	B-8
IC101	G-6
IC102	F-7
IC103	F-8
IC104	G-7
IC105	G-6
IC1501	F-3
IC1502	D-4
IC1503	D-3
IC1504	E-3
IC1505	D-2
IC1506	C-4
IC1507	C-2
IC1508	D-4
IC1509	B-4
IC1510	B-2
IC1601	C-7
IC1602	E-6
IC1603	E-6
IC1604	G-2
IC1605	C-5
Q101	G-6
Q102	G-6
Q103	G-4
Q104	G-4
Q105	G-4
Q106	G-4
Q107	F-8
Q108	E-5
Q1501	F-3
Q1502	E-4
Q1503	E-5
Q1504	F-5
Q1505	F-5
Q1506	F-6
Q1507	E-4
Q1508	E-4
Q1509	E-2
Q1510	E-3
Q1511	E-2
Q1512	E-2
Q1513	E-2
Q1514	E-2
Q1515	C-3
Q1517	D-2
Q1518	C-2
Q1601	B-6
Q1602	B-6
Q1604	E-7
Q1605	E-6
Q1606	E-6
Q1607	D-6
Q1608	G-2
Q1609	H-2
Q1610	G-2
Q1611	D-9
Q1612	G-2
Q1613	G-2
Q1614	F-2
Q1615	C-8
Q1616	F-2
Q1617	C-8
Q1618	B-7
Q1619	E-7
TP1502	E-4
VR101	F-7
VR102	F-7
VR1502	B-2
VR1503	E-4
VR1504	F-2
VR1601	E-7


1
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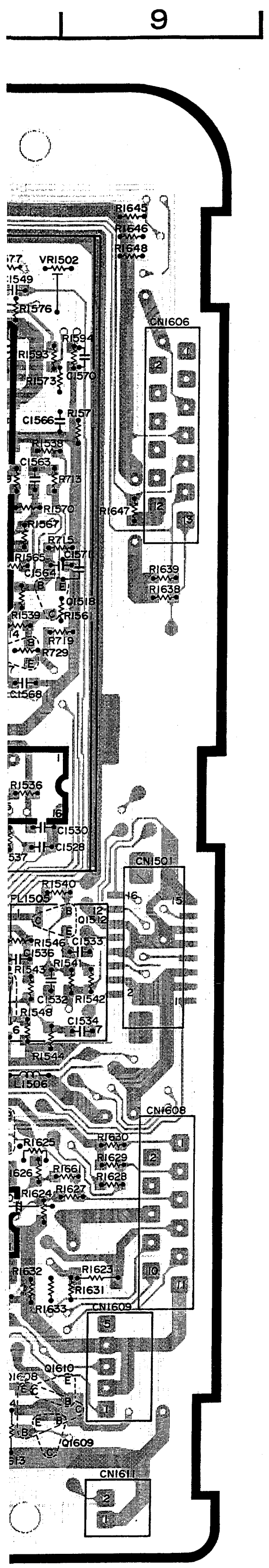
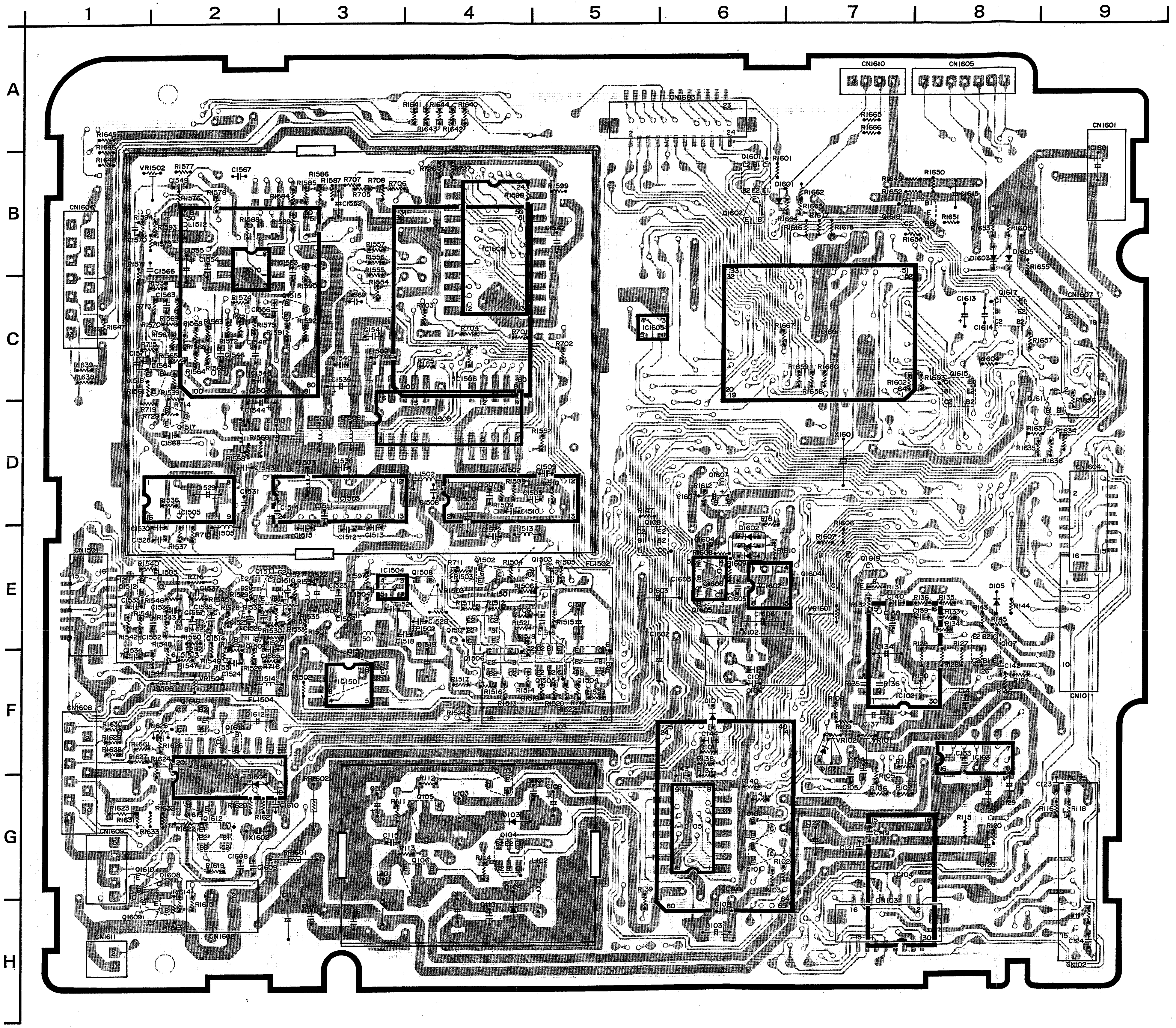
D
E
F
G
H
CN1606
CN1501
CN1608
CN1609
CN1611


9
CN1606
CN1501
CN1608
CN1609
CN1611

SYSCON-SERVO C.B.A.(SOLDERING SIDE)

D101	F-6
D102	F-7
D103	G-4
D104	G-4
D105	E-8
D1601	B-6
D1602	E-6
D1603	B-8
D1604	G-2
D1605	B-8
IC101	G-6
IC102	F-7
IC103	F-8
IC104	G-7
IC105	G-6
IC1501	F-3
IC1502	D-4
IC1503	D-3
IC1504	E-3
IC1505	D-2
IC1506	C-4
IC1507	C-2
IC1508	D-4
IC1509	B-4
IC1510	B-2
IC1601	C-7
IC1602	E-6
IC1603	E-6
IC1604	G-2
IC1605	C-5
Q101	G-6
Q102	G-6
Q103	G-4
Q104	G-4
Q105	G-4
Q106	G-4
Q107	F-8
Q108	E-5
Q1501	F-3
Q1502	E-4
Q1503	E-5
Q1504	F-5
Q1505	F-5
Q1506	F-6
Q1507	E-4
Q1508	E-4
Q1509	E-2
Q1510	E-3
Q1511	E-2
Q1512	E-2
Q1513	E-2
Q1514	E-2
Q1515	C-3
Q1517	D-2
Q1518	C-2
Q1601	B-6
Q1602	B-6
Q1604	E-7
Q1605	E-6
Q1606	E-6
Q1607	D-6
Q1608	G-2
Q1609	H-2
Q1610	G-2
Q1611	D-9
Q1612	G-2
Q1613	G-2
Q1614	F-2
Q1615	C-8
Q1616	F-2
Q1617	C-8
Q1618	B-7
Q1619	E-7
TP1502	E-4
VR101	F-7
VR102	F-7
VR1502	B-2
VR1503	E-4
VR1504	F-2
VR1601	E-7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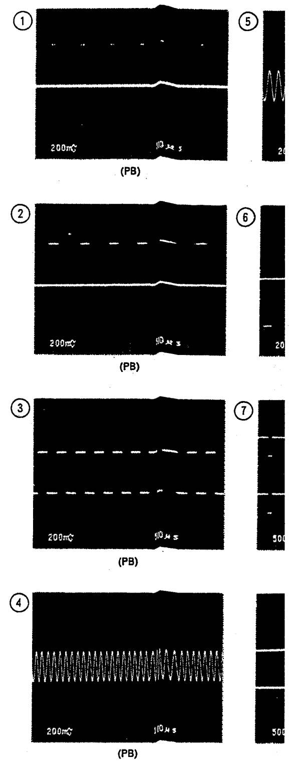
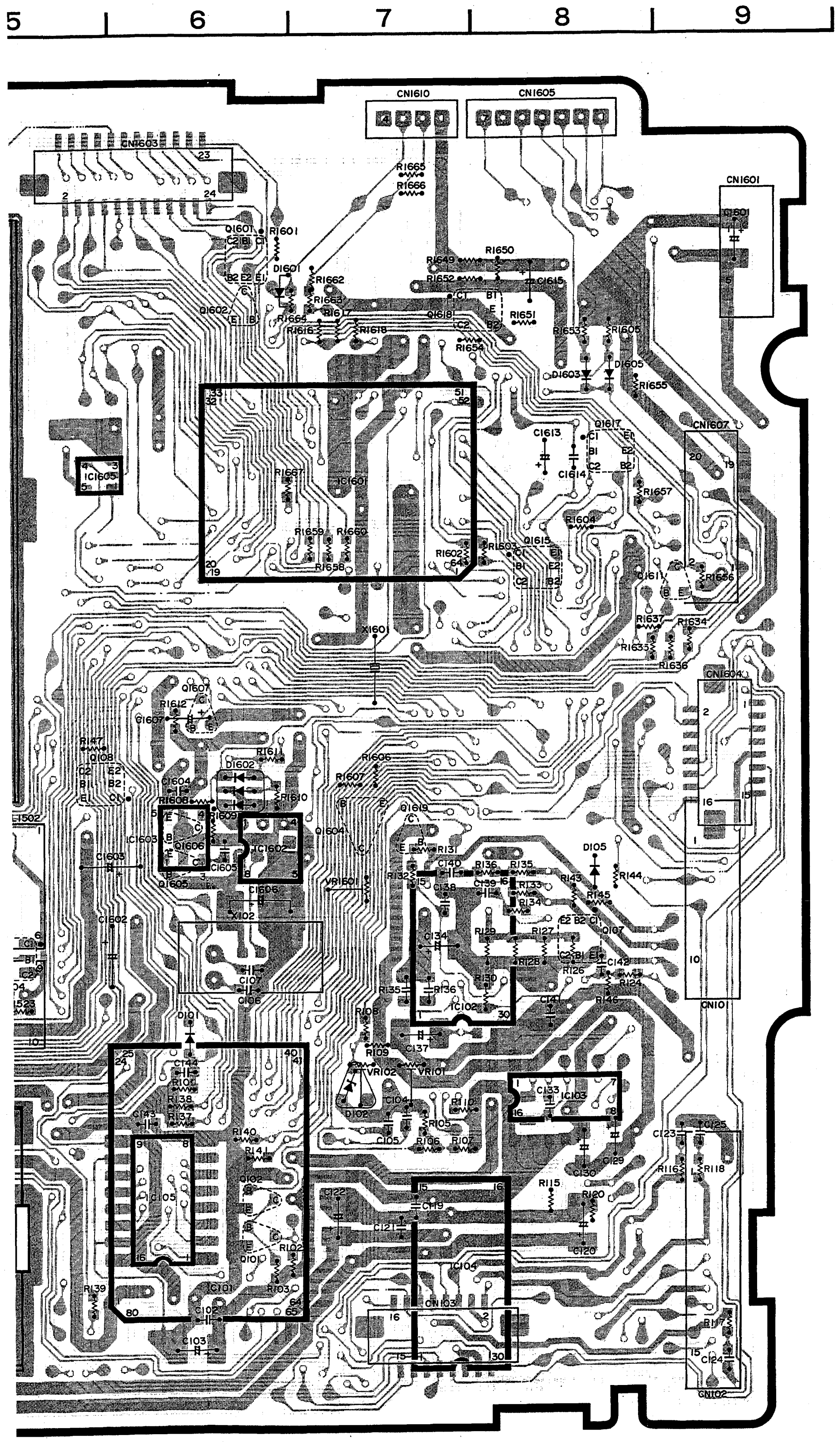
G
H
CN1610
CN1605
CN1603
CN1601
CN1606
CN1607
CN1604
CN1507
CN1608
CN1609
CN1611
CN1602
CN1610
CN103
CN102
IC1601
IC1509
IC1510
IC1506
IC1508
IC1507
IC1505
IC1503
IC1502
IC1504
IC1501
IC1605
IC1602
IC1604
IC101
IC102
IC103
IC104
IC105
X1601
X102
FL1502
FL1503
FL1504
FL1505

SIGNAL WA



RECORDER-

D001	E-7
D002	E-7
D003	E-6
D004	D-6
D005	D-6
IC001	E-6
IC002	D-8
IC003	E-2
IC004	E-3
Q001	D-6
Q002	D-6
Q003	D-7
Q004	E-4
TP001	E-5
TP003	D-3
VC001	E-6


5
6
7
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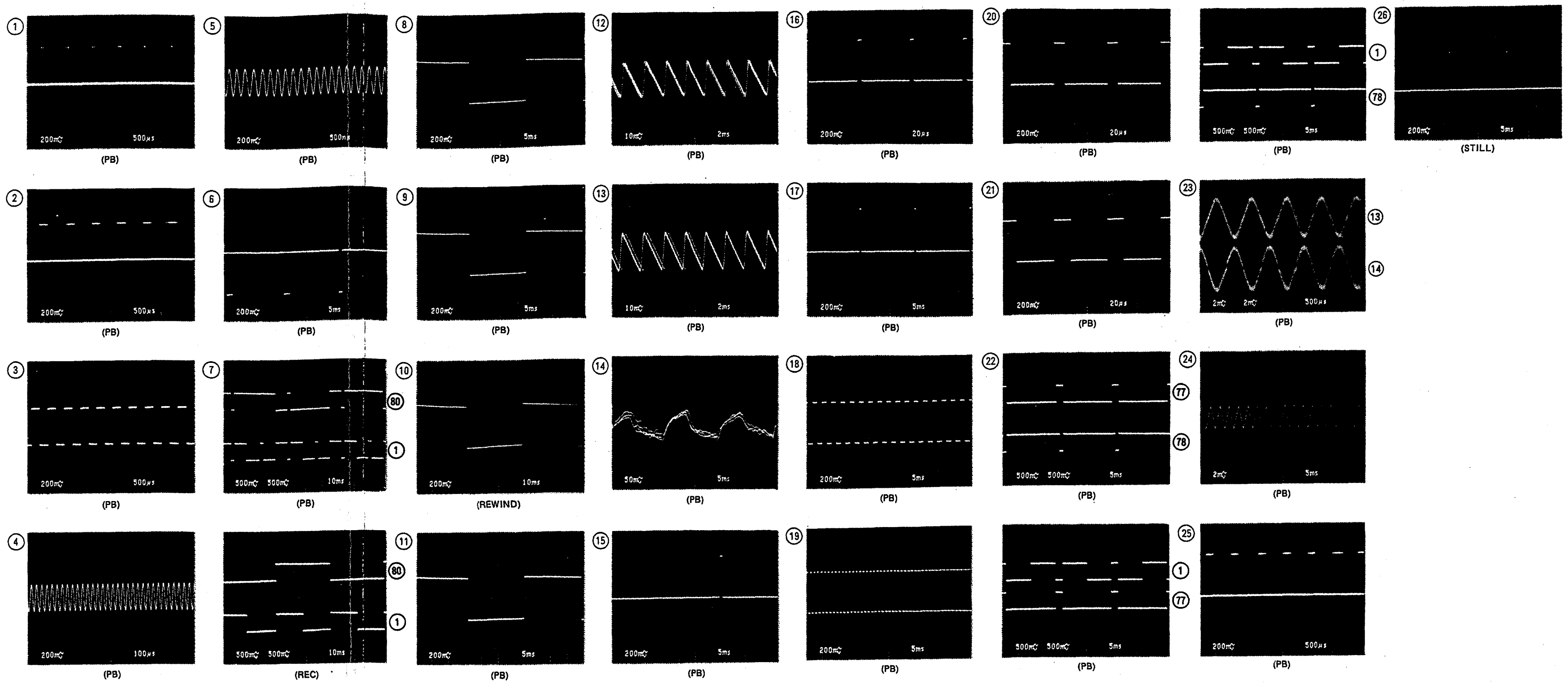
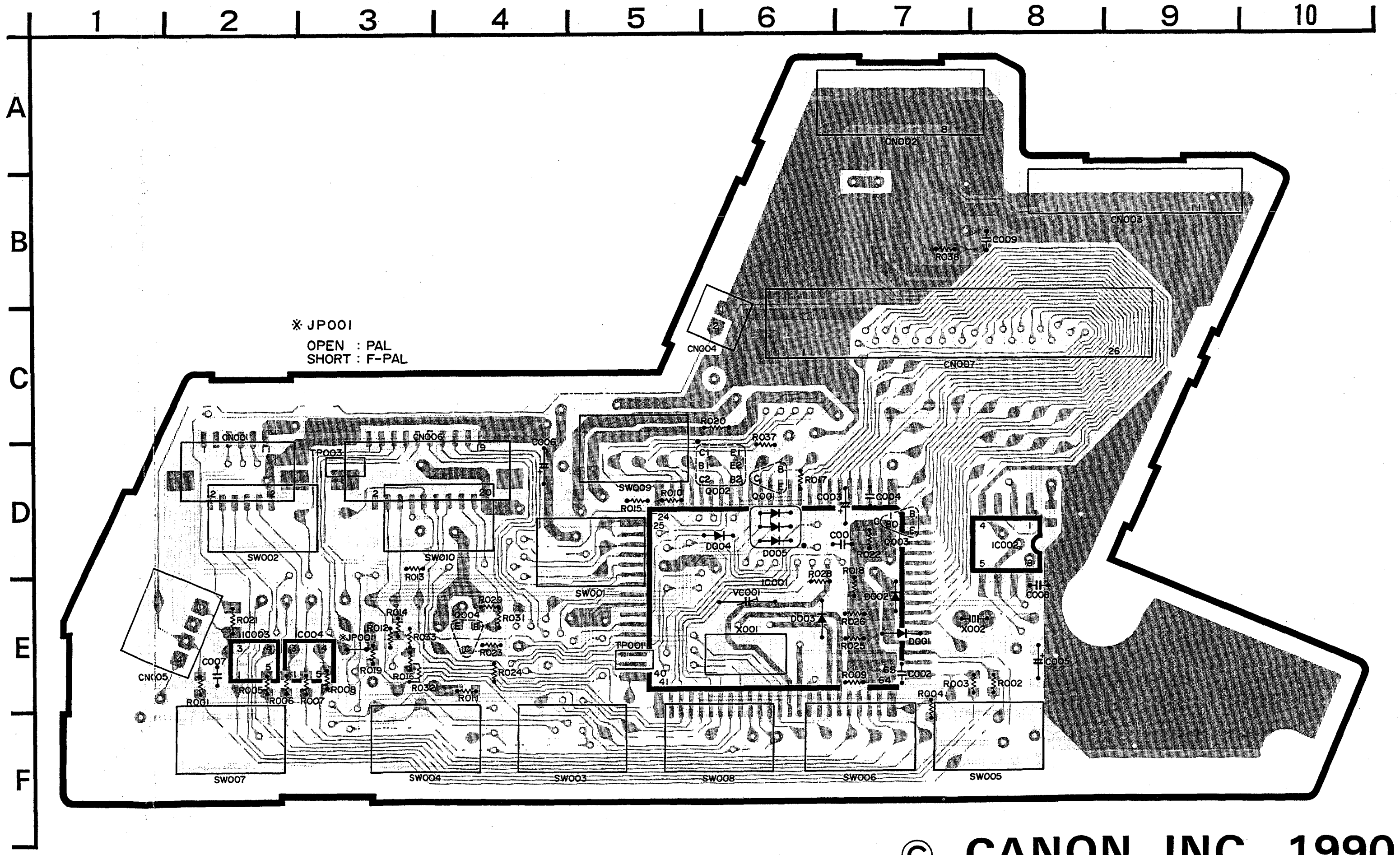
9
CN1610
CN1605
CN1603
CN1601
CN1607
CN1604
CN101
CN102
CN103
IC101
IC102
IC103
IC105
IC1601
IC1602
IC1603
IC1605
X1601

SIGNAL WAVEFORMS



RECORDER–KEY (1) C.B.A.

D001	E–7
D002	E–7
D003	E–6
D004	D–6
D005	D–6
IC001	E–6
IC002	D–8
IC003	E–2
IC004	E–3
Q001	D–6
Q002	D–6
Q003	D–7
Q004	E–4
TP001	E–5
TP003	D–3
VC001	E–6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A
B
C
D
E
F
CN002
CN003
CN004
CN005
CN006
CN007
IC001
IC002
SW001
SW002
SW003
SW004
SW005
SW006
SW007
SW008
SW009
SW010
TP001
TP003
VC001
X001
X002

※ JP001
OPEN : PAL
SHORT : F-PAL

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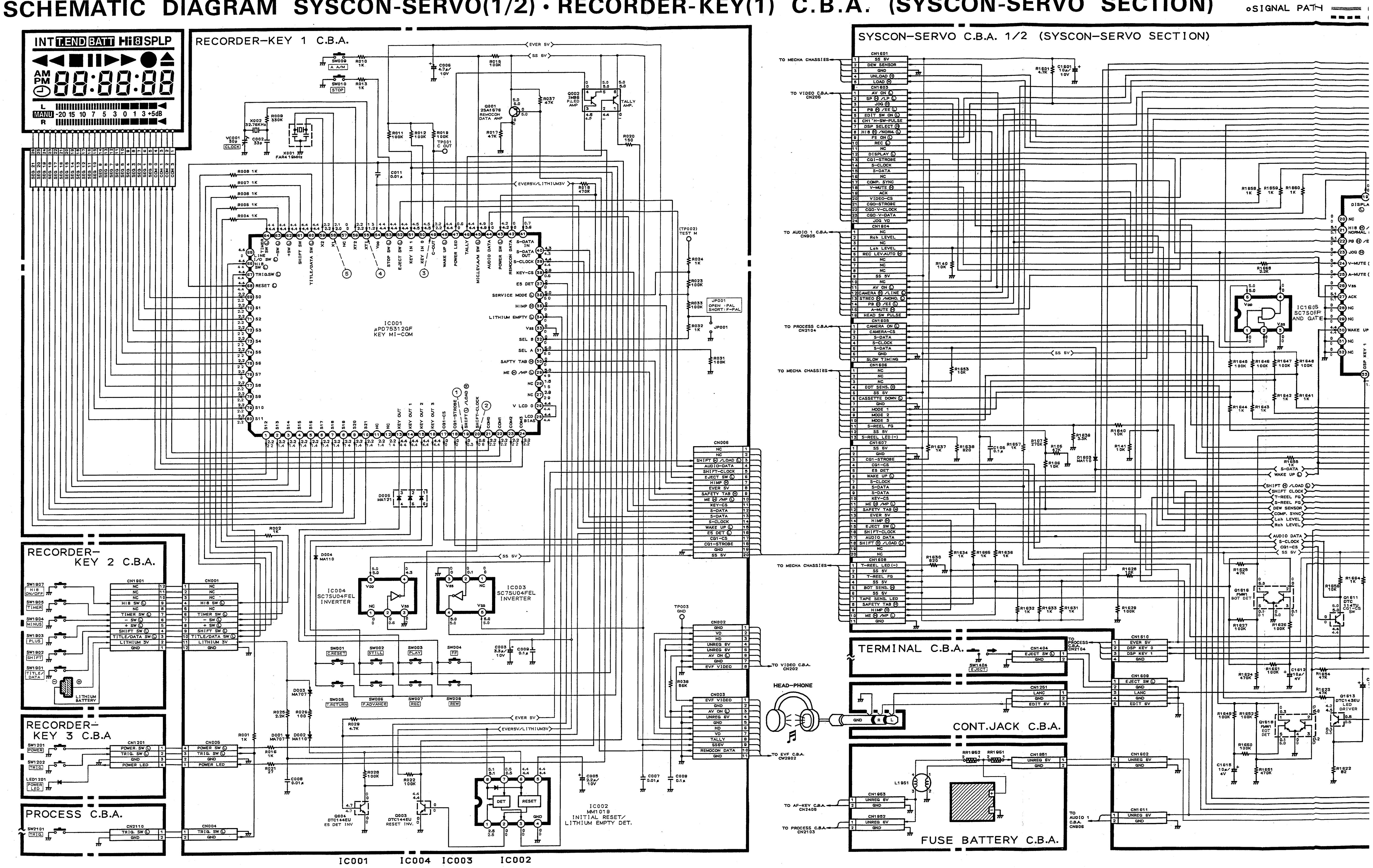
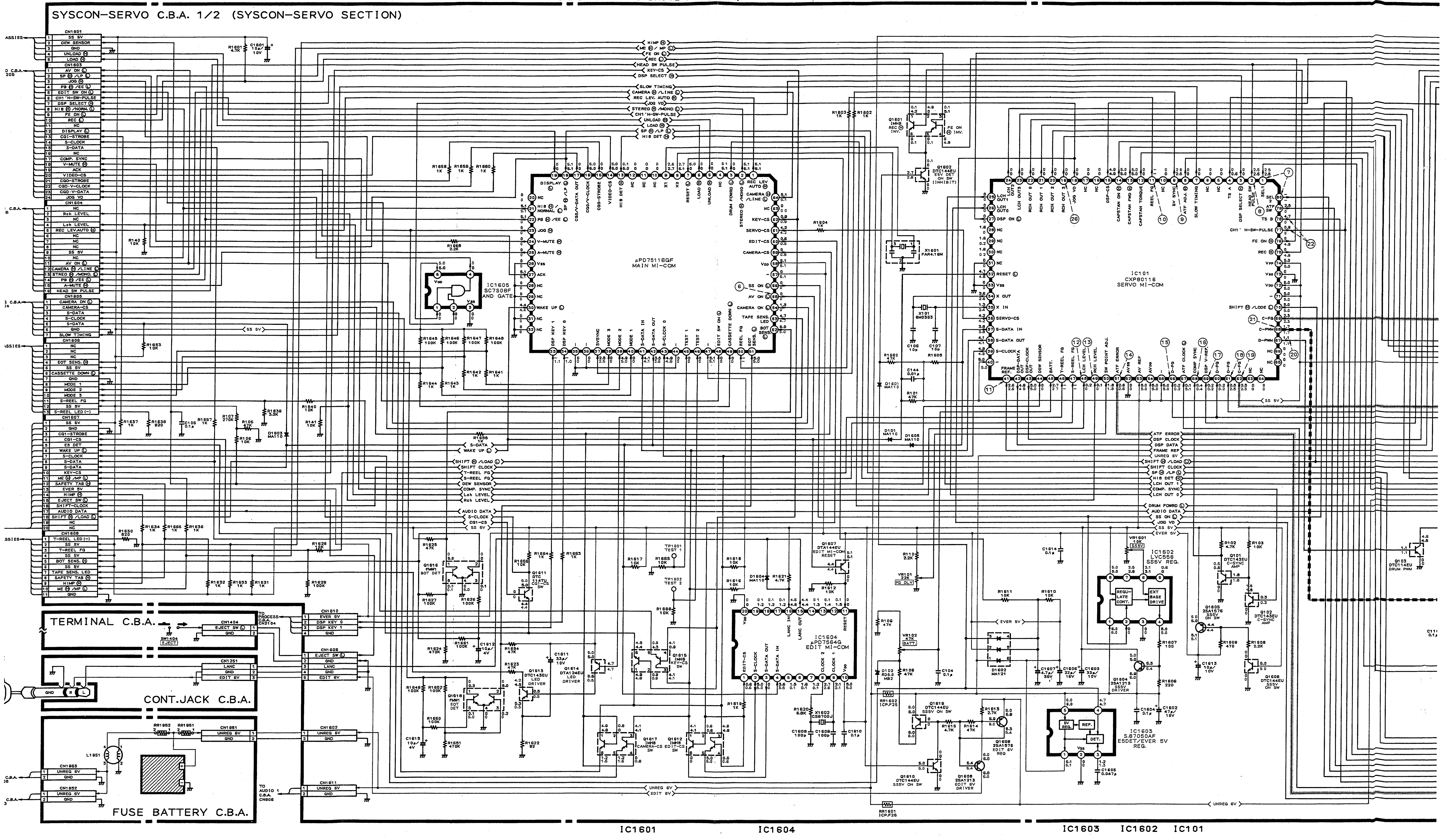
SCHEMATIC DIAGRAM SYSCON-SERVO(1/2) · RECORDER-KEY(1) C.B.A. (SYSCON-SERVO SECTION)


SIGNAL PATH
RECORDER-KEY 1 C.B.A.
SYSCON-SERVO C.B.A. 1/2 (SYSCON-SERVO SECTION)
INT T.END BATT Hi8 SPLP
AM PM
MANU -20 15 10 7 5 3 0 1 3 +5dB
IC001 μPD75312GF KEY MI-COM
IC004 SC7SU04FEL INVERTER
IC003 SC7SU04FEL INVERTER
IC002 MM1019 INITIAL RESET/ LITHIUM EMPTY DET.
IC1605 SC7S08F AND GATE
RECORDER-KEY 2 C.B.A.
RECORDER-KEY 3 C.B.A
PROCESS C.B.A.
TERMINAL C.B.A.
CONT.JACK C.B.A.
FUSE BATTERY C.B.A.
HEAD-PHONE
TO MECHA CHASSIES
TO VIDEO C.B.A. CN208
TO AUDIO 1 C.B.A. CN905
TO PROCESS C.B.A. CN2104
TO VIDEO C.B.A. CN202
TO EVF C.B.A. CW2802
TO AF-KEY C.B.A. CN2405
TO PROCESS C.B.A. CN2103
CN006
CN002
CN003
CN004
CN005
CN1601
CN1603
CN1604
CN1605
CN1606
CN1607
CN1608
CN1609
CN1610
CN1611
CN1602
SW1907 Hi8 ON/OFF
SW1906 TIMER
SW1904 MINUS
SW1903 PLUS
SW1902 SHIFT
SW1901 TITLE/DATA
LITHIUM BATTERY
SW1201 POWER
SW1202 TRIG.
LED1201 POWER
SW2101 TRIG.
SW001 C.RESET
SW002 STILL
SW003 PLAY
SW004 FF
SW005 T.RETURN
SW006 F.ADVANCE
SW007 REC
SW008 REW
SW009 A A/M
SW010 STOP
SW1404 EJECT
IC001 IC004 IC003 IC002

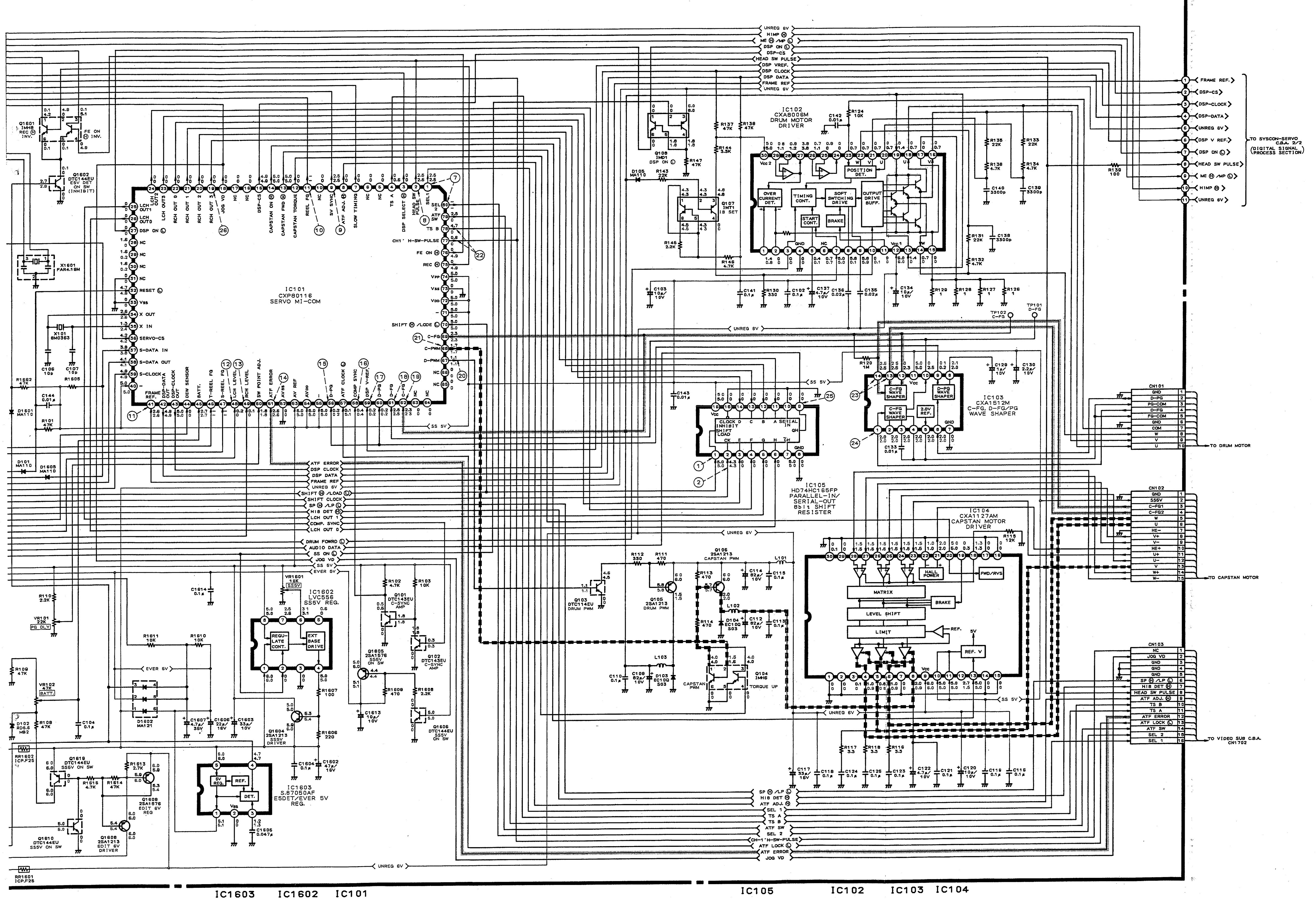
01 Nov. 1990

.B.A. (SYSCON-SERVO SECTION)

○SIGNAL PATH ▬ CAPSTAN SERVO FEEDBACK-ATF. FG (BLUE)
---- CAPSTAN SERVO DRIVE-PWM (BLUE)
DRUM SERVO FEEDBACK-FG. PG (ORANGE)
DRUM SERVO DRIVE-PWM (ORANGE)


SYSCON-SERVO C.B.A. 1/2 (SYSCON-SERVO SECTION)
CN1601
CN1603
CN1604
CN1605
CN1606
CN1607
CN1608
IC1605 SC7S08F AND GATE
μPD75116GF MAIN MI-COM
IC101 CXP80116 SERVO MI-COM
X1601 FAR4.19M
X101 8M0353
IC1604 μPD7564G EDIT MI-COM
IC1602 LVC556 SS5V REG.
IC1603 S-87050AF E5DET/EVER 5V REG.
Q103 DTC114EU DRUM PWM
TERMINAL C.B.A.
CN1404
EJECT SW
CONT.JACK C.B.A.
CN1251
LANC
EDIT 6V
FUSE BATTERY C.B.A.
CN1951
CN1953
CN1952
UNREG 6V
GND
L1951
CN1610
CN1609
CN1602
CN1611
EVER 5V
SS 5V
IC1601
IC1604
IC1603
IC1602
IC101

SERVO FEEDBACK–FG. PG (ORANGE)
SERVO DRIVE–PWM (ORANGE)


IC101 CXP80116 SERVO MI-COM
IC102 CXA8006M DRUM MOTOR DRIVER
IC103 CXA1512M C-FG, D-FG/PG WAVE SHAPER
IC104 CXA1127AM CAPSTAN MOTOR DRIVER
IC105 HD74HC165FP PARALLEL-IN/SERIAL-OUT 8bit SHIFT RESISTER
IC1602 LVC556 SS5V REG.
IC1603 S.87050AF ESDET/EVER 5V REG.
TO SYSCON-SERVO C.B.A. 2/2 (DIGITAL SIGNAL PROCESS SECTION)
FRAME REF.
DSP-CS
DSP-CLOCK
DSP-DATA
UNREG 6V
DSP V REF.
DSP ON
HEAD SW PULSE
ME H /MP L
HIMP H
CN101
TO DRUM MOTOR
CN102
TO CAPSTAN MOTOR
CN103
TO VIDEO SUB C.B.A. CN1702
X1601 FAR4.19M
X101 8M0363
Q1601 IMH8 REC H INV.
Q1602 DTC144EU ESV DET ON SW (INHIBIT)
Q108 IMD1 DSP ON
Q107 IMT1 18 SET
Q103 DTC114EU DRUM PWM
Q105 2SA1213 DRUM PWM
Q106 2SA1213 CAPSTAN PWM
Q104 IMH8 TORQUE UP
Q101 DTC143EU C-SYNC AMP
Q102 DTC143EU C-SYNC AMP
Q1605 2SA1576 SS5V ON SW
Q1606 DTC144EU SS5V ON SW
Q1604 2SA1213 SS5V DRIVER
Q1619 DTC144EU SS5V ON SW
Q1609 2SA1576 EDIT 6V REG
Q1610 DTC144EU SS5V ON SW
Q1608 2SA1213 EDIT 6V DRIVER
TP102 C-FG
TP101 D-FG
IC1603
IC1602
IC101
IC105
IC102
IC103
IC104

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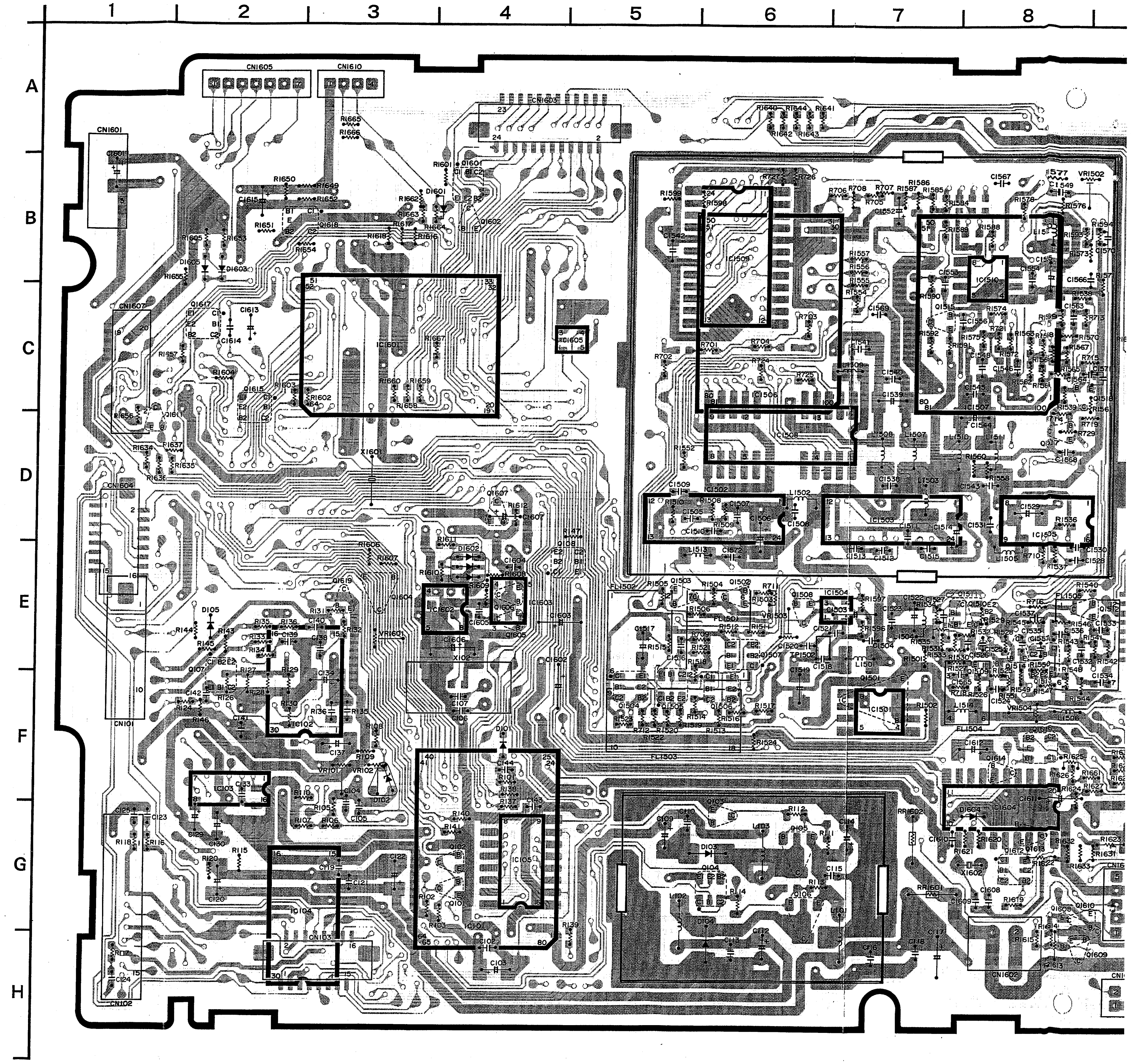
CIRCUIT BOARD DIAGRAM SYSCON-SERVO • RECORDER-KEY(1) C.B.A.

SYSCON–SERVO C.B.A.(COMPONENT SIDE)

D101	F–4
D102	F–3
D103	G–6
D104	G–6
D105	E–2
D1601	B–4
D1602	E–4
D1603	B–2
D1604	G–8
D1605	B–2
IC101	G–4
IC102	F–3
IC103	F–2
IC104	G–3
IC105	G–4
IC1501	F–7
IC1502	D–6
IC1503	D–7
IC1504	E–7
IC1505	D–8
IC1506	C–6
IC1507	C–8
IC1508	D–6
IC1509	B–6
IC1510	B–8
IC1601	C–3
IC1602	E–4
IC1603	E–4
IC1604	G–8
IC1605	C–5
Q101	G–4
Q102	G–4
Q103	G–6
Q104	G–6
Q105	G–6
Q106	G–6
Q107	F–2
Q108	E–5
Q1501	F–7
Q1502	E–6
Q1503	E–5
Q1504	F–5
Q1505	F–5
Q1506	F–6
Q1507	E–6
Q1508	E–6
Q1509	E–8
Q1510	E–8
Q1511	E–8
Q1512	E–9
Q1513	E–8
Q1514	E–8
Q1515	C–7
Q1517	D–8
Q1518	C–8
Q1601	B–4
Q1602	B–4
Q1604	E–3
Q1605	E–4
Q1606	E–4
Q1607	D–4
Q1608	G–8
Q1609	H–8
Q1610	G–8
Q1611	D–1
Q1612	G–8
Q1613	G–8
Q1614	F–8
Q1615	C–2
Q1616	F–8
Q1617	C–2
Q1618	B–3
Q1619	E–3
TP1502	E–6
VR101	F–3
VR102	F–3
VR1502	B–8
VR1503	E–6
VR1504	F–8
VR1601	E–3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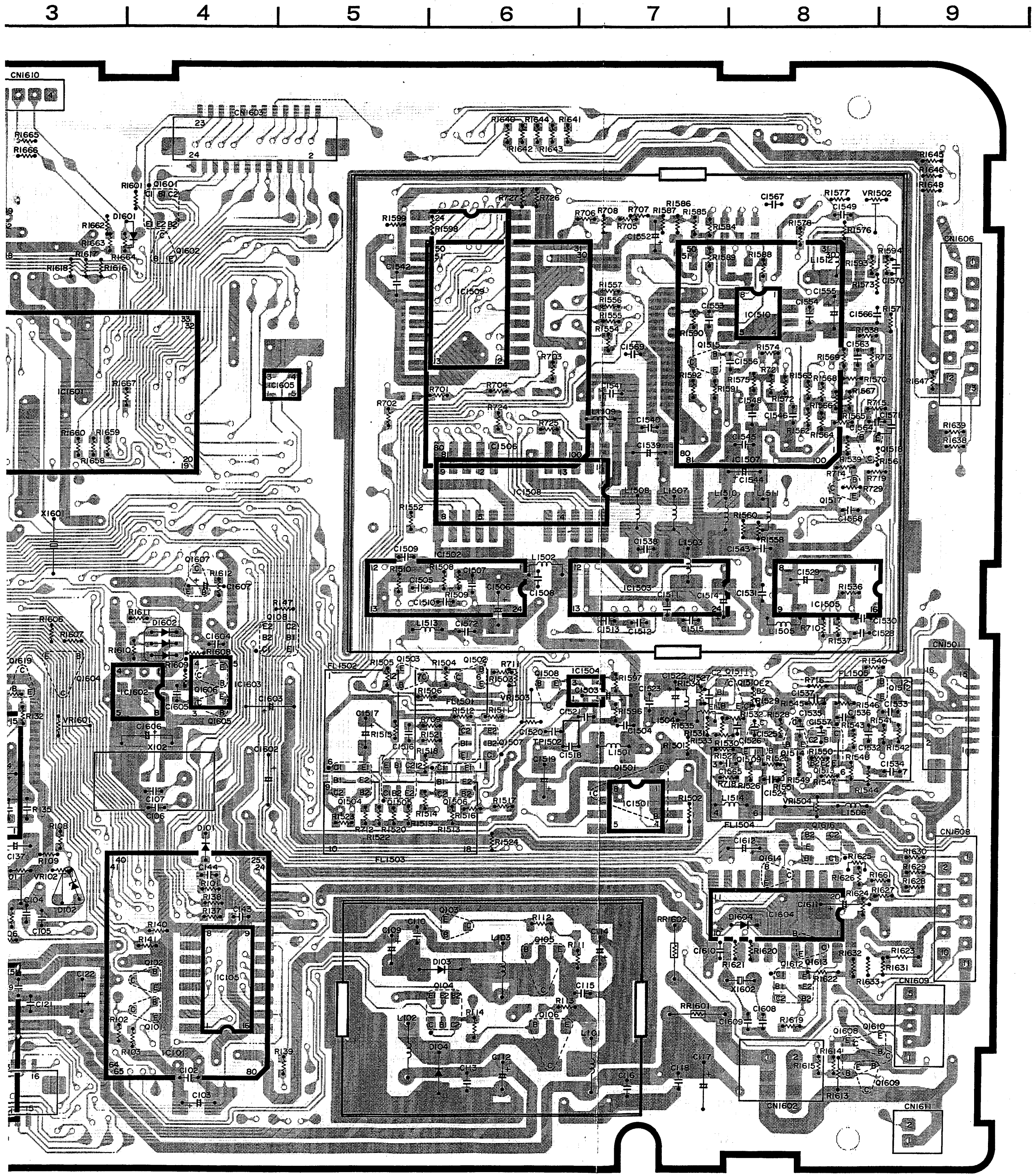
CN1605
CN1610
CN1603
CN1601
CN1607
CN1604
CN101
CN102
CN1602
IC1601
IC1605
IC1509
IC1506
IC1508
IC1510
IC1507
IC1502
IC1503
IC1505
IC1504
IC1501
IC1602
IC1603
IC102
IC103
IC104
IC105
IC1604

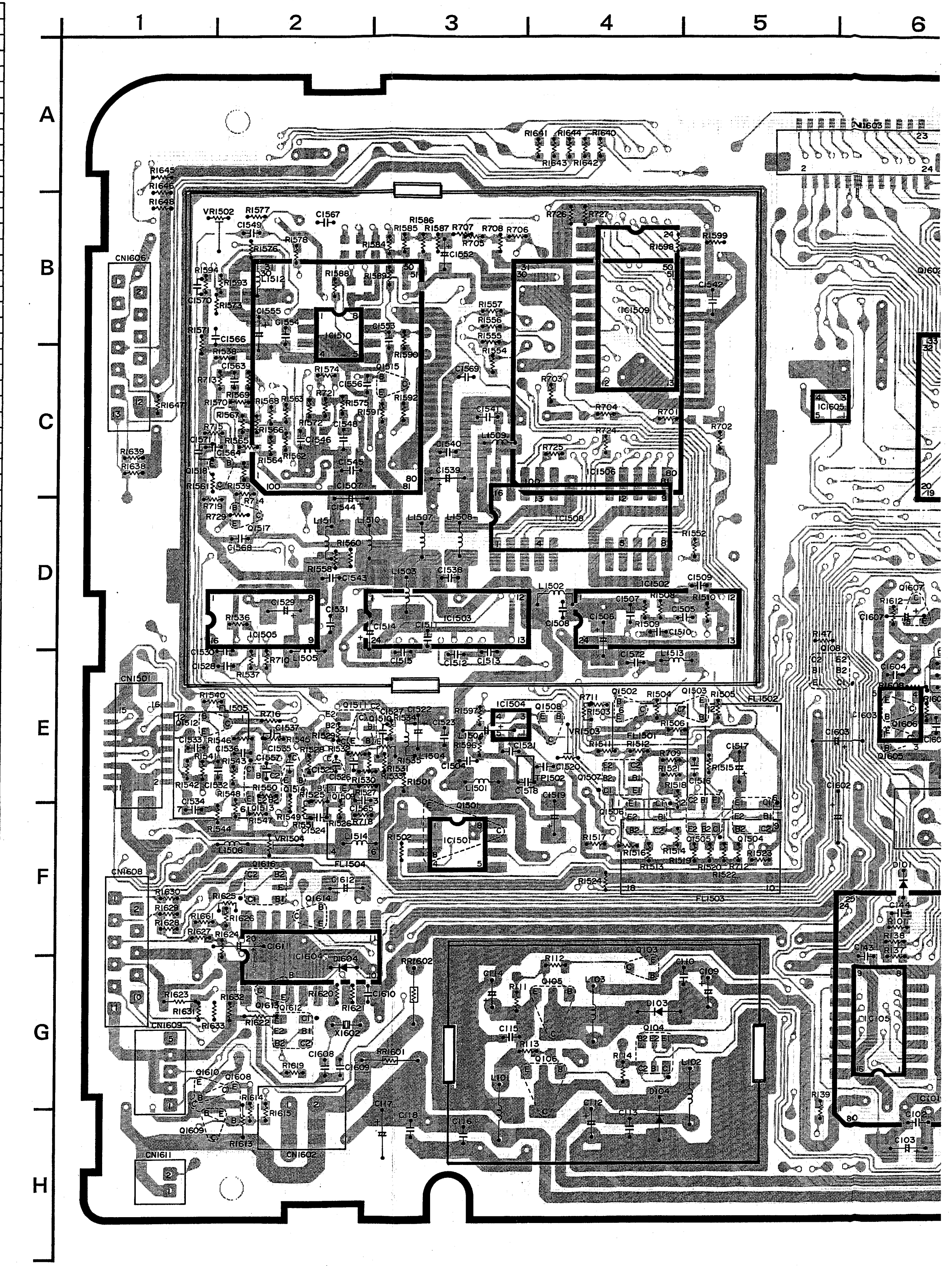
YSCON-SERVO · RECORDER-KEY(1) C.B.A.

ONENT SIDE)

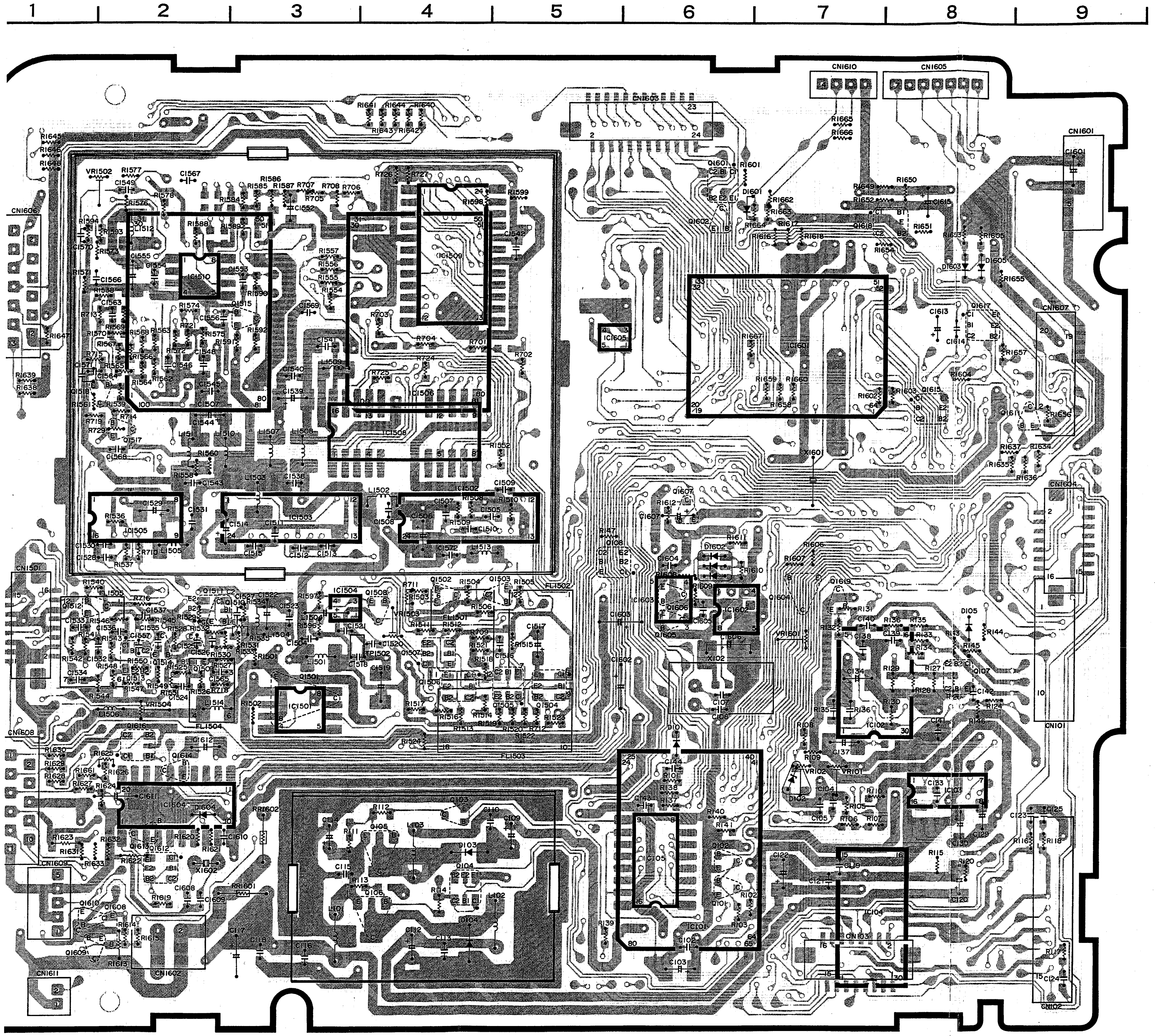


SYSCON–SERVO C.B.A.(SOLDERING SIDE)

D101	F–6
D102	F–7
D103	G–4
D104	G–4
D105	E–8
D1601	B–6
D1602	E–6
D1603	B–8
D1604	G–2
D1605	B–8
IC101	G–6
IC102	F–7
IC103	F–8
IC104	G–7
IC105	G–6
IC1501	F–3
IC1502	D–4
IC1503	D–3
IC1504	E–3
IC1505	D–2
IC1506	C–4
IC1507	C–2
IC1508	D–4
IC1509	B–4
IC1510	B–2
IC1601	C–7
IC1602	E–6
IC1603	E–6
IC1604	G–2
IC1605	C–5
Q101	G–6
Q102	G–6
Q103	G–4
Q104	G–4
Q105	G–4
Q106	G–4
Q107	F–8
Q108	E–5
Q1501	F–3
Q1502	E–4
Q1503	E–5
Q1504	F–5
Q1505	F–5
Q1506	F–6
Q1507	E–4
Q1508	E–4
Q1509	E–2
Q1510	E–3
Q1511	E–2
Q1512	E–2
Q1513	E–2
Q1514	E–2
Q1515	C–3
Q1517	D–2
Q1518	C–2
Q1601	B–6
Q1602	B–6
Q1604	E–7
Q1605	E–6
Q1606	E–6
Q1607	D–6
Q1608	G–2
Q1609	H–2
Q1610	G–2
Q1611	D–9
Q1612	G–2
Q1613	G–2
Q1614	F–2
Q1615	C–8
Q1616	F–2
Q1617	C–8
Q1618	B–7
Q1619	E–7
TP1502	E–4
VR101	F–7
VR102	F–7
VR1502	B–2
VR1503	E–4
VR1504	F–2
VR1601	E–7



VO C.B.A.(SOLDERING SIDE)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CN1610
CN1605
CN1603
CN1601
CN1606
CN1607
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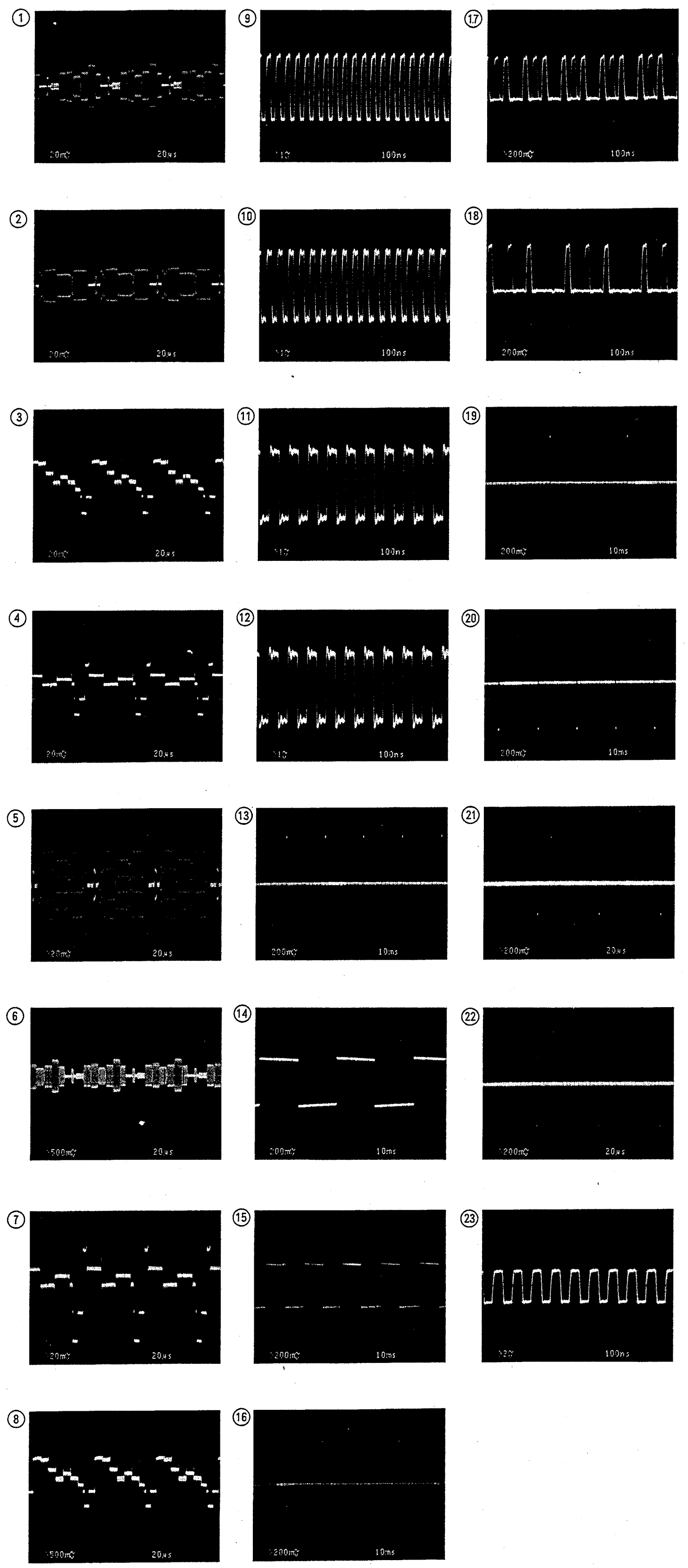
CN101
CN1608
CN1609
CN1611
CN1602
CN102
CN103
IC1510
IC1509
IC1507
IC1508
IC1506
IC1505
IC1503
IC1502
IC1504
IC1501
IC1601
IC1605
IC1603
IC1602
IC1611
IC1604
IC101
IC102
IC103
IC104
X1601
X1602
VR1501
VR1502
VR1504
VR101
VR102
FL1502
FL1503
FL1504

SIGNAL WAVEFORMS



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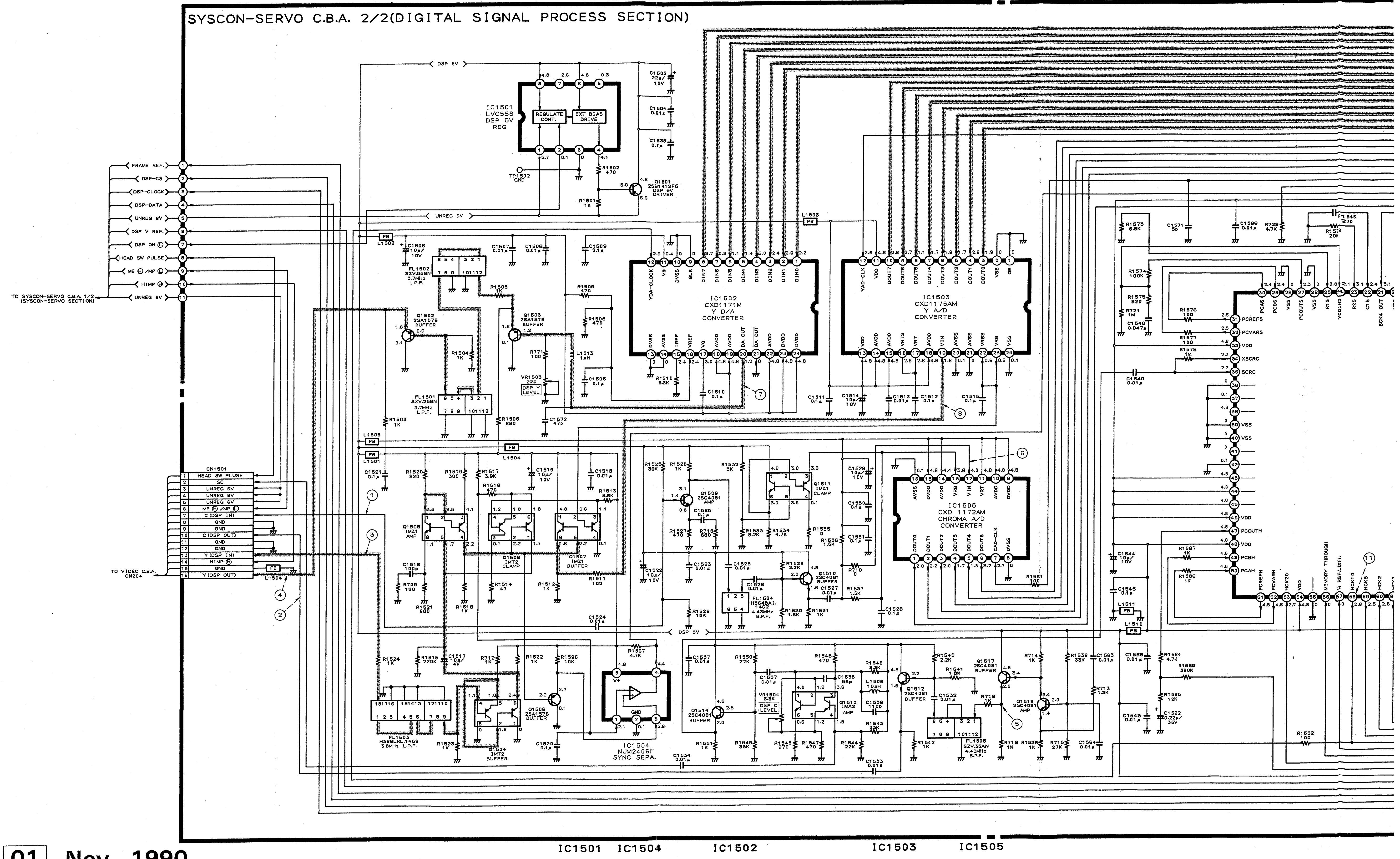
SCHEMATIC DIAGRAM SYSCON-SERVO(2/2) C.B.A. (DIGITAL SIGNAL PROCESS SECTION)

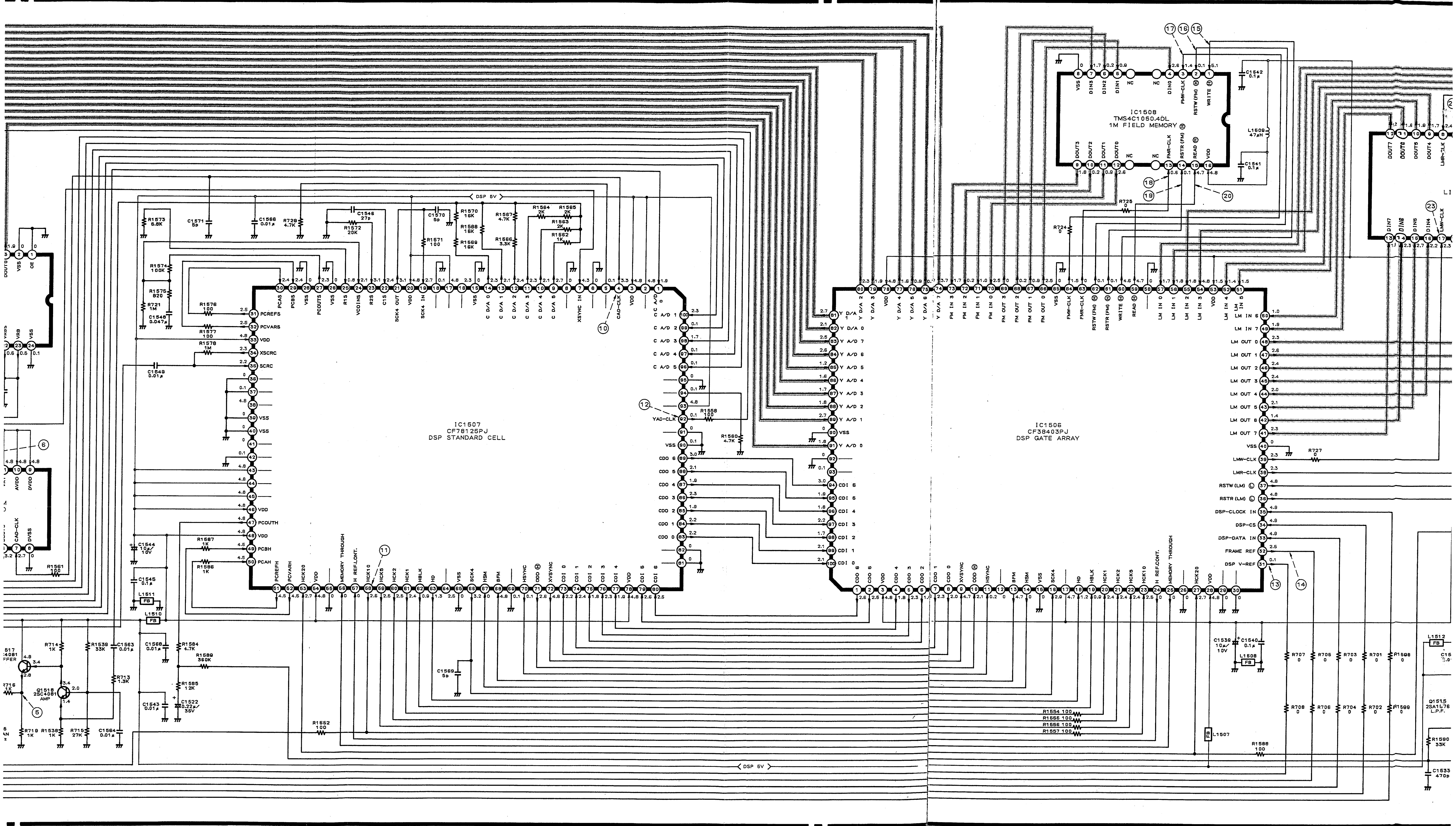
○SIGNAL PATH ▨ Y+C SIGNAL (GRAY) ▨ Y SIGNAL (BLUE)


SYSCON-SERVO C.B.A. 2/2(DIGITAL SIGNAL PROCESS SECTION)
TO SYSCON-SERVO C.B.A. 1/2 (SYSCON-SERVO SECTION)
FRAME REF.
DSP-CS
DSP-CLOCK
DSP-DATA
UNREG 6V
DSP V REF.
DSP ON Ⓛ
HEAD SW PULSE
ME Ⓗ /MP Ⓛ
HIMP Ⓗ
UNREG 6V
DSP 5V
UNREG 6V
IC1501 LVC556 DSP 5V REG
REGULATE CONT.
EXT BIAS DRIVE
TP1502 GND
Q1501 2SB1412F5 DSP 5V DRIVER
R1502 470
R1501 1K
C1503 22µ/10V
C1504 0.01µ
C1538 0.1µ
FL1502 SZV.558N 3.7MHz L.P.F.
FL1501 SZV.258N 3.7MHz L.P.F.
Q1502 2SA1576 BUFFER
Q1503 2SA1576 BUFFER
R1505 1K
R1504 1K
R1503 1K
R1506 680
R771 100
VR1503 220 DSP Y LEVEL
L1513 1µH
R1509 470
R1508 470
C1505 0.1µ
C1509 0.1µ
C1572 47p
IC1502 CXD1171M Y D/A CONVERTER
IC1503 CXD1175AM Y A/D CONVERTER
IC1505 CXD 1172AM CHROMA A/D CONVERTER
IC1504 NJM2406F SYNC SEPA.
R1510 3.3K
C1510 0.1µ
C1511 0.1µ
C1514 10µ/10V
C1513 0.01µ
C1512 0.1µ
C1515 0.1µ
L1503 FB
L1502 FB
L1505 FB
L1501 FB
L1504 FB
CN1501
HEAD SW PLUSE
SC
UNREG 6V
ME Ⓗ /MP Ⓛ
GND
C (DSP IN)
C (DSP OUT)
Y (DSP IN)
HIMP Ⓗ
Y (DSP OUT)
TO VIDEO C.B.A. CN204
Q1505 IMZ1 AMP
Q1506 IMT2 CLAMP
Q1507 IMZ1 BUFFER
Q1508 2SA1576 BUFFER
Q1504 IMT2 BUFFER
Q1509 2SC4081 AMP
Q1510 2SC4081 BUFFER
Q1511 IMZ1 CLAMP
Q1512 2SC4081 BUFFER
Q1513 IMX2 AMP
Q1514 2SC4081 BUFFER
Q1517 2SC4081 BUFFER
Q1518 2SC4081 AMP
FL1503 H366LRL.1459 3.58MHz L.P.F.
FL1504 H364BAI.1462 4.43MHz B.P.F.
FL1505 SZV.35AN 4.43MHz B.P.F.
VR1504 3.3K DSP C LEVEL
L1506 10µH
R1561 100
PCREFS
PCVARS
VDD
XSCRC
SCRC
VSS
PCOUTH
PCBH
PCAH
PCREFH
PCVARH
HCK20
MEMORY THROUGH
REFL.DNT.
HCK10
HCK5
HCK2
PCAS
PCBS
VSS
PCOUTS
VCOIRQ
R2S
C1S
SCK4 OUT
R1573 6.8K
C1571 5p
C1566 0.01µ
R729 4.7K
C1546 27p
R1572 20K
R1574 100K
R1575 820
R721 1M
C1548 0.047µ
R1576 100
R1577 100
R1578 1M
C1549 0.01µ
C1544 10µ/16V
C1545 0.1µ
R1587 1K
R1586 1K
L1511 FB
L1510 FB
R1584 4.7K
R1589 360K
R1585 12K
C1522 0.22µ/35V
R1552 100
IC1501 IC1504 IC1502 IC1503 IC1505

01 Nov. 1990

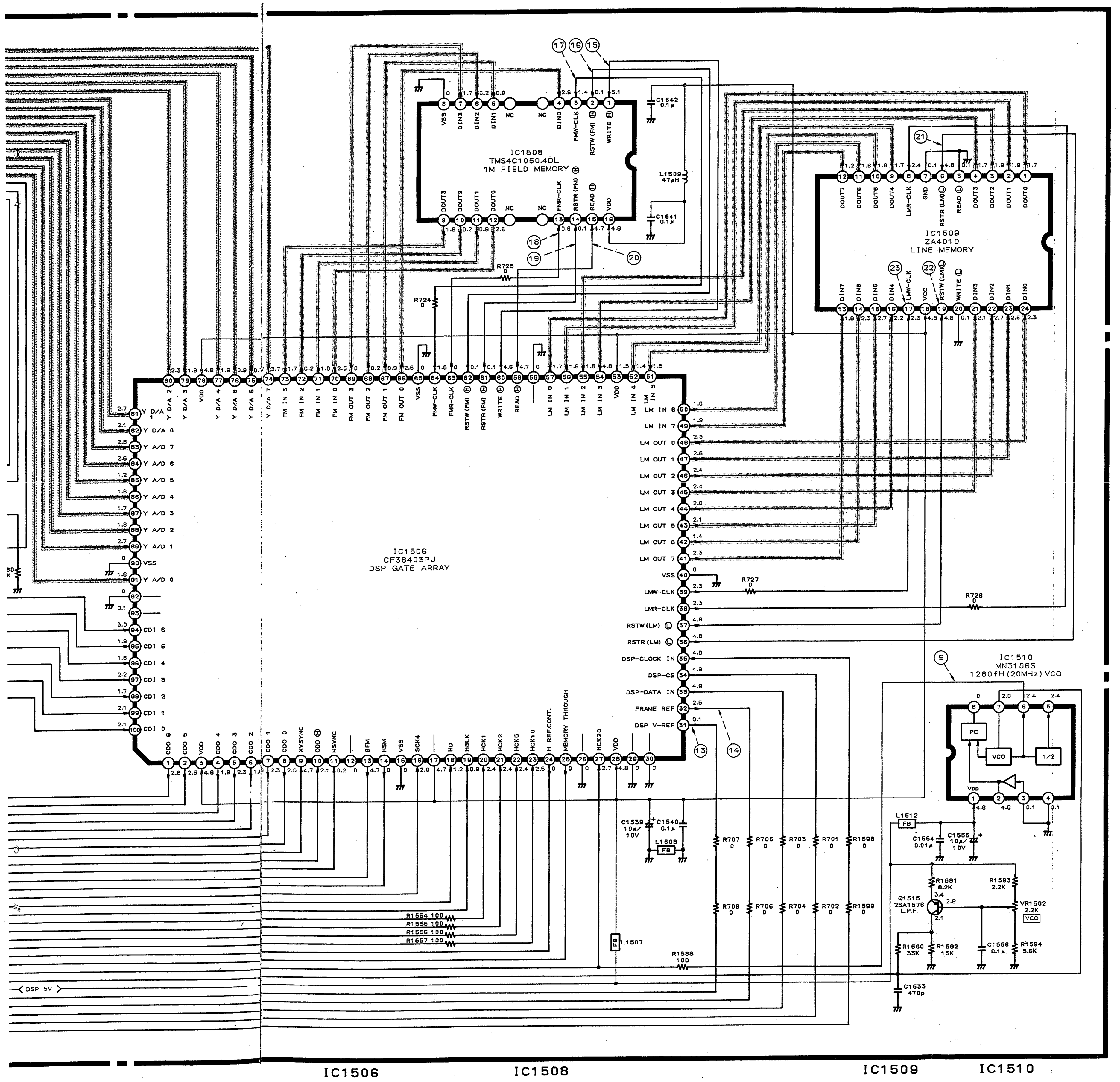
S SECTION)

ATH Y+C SIGNAL (GRAY) Y SIGNAL (BLUE) C SIGNAL (ORANGE)



IC1508
TMS4C1050.4DL
1M FIELD MEMORY ⓗ
IC1507
CF78125PJ
DSP STANDARD CELL
IC1506
CF38403PJ
DSP GATE ARRAY
DSP 5V
Q1518
2SC4081
AMP
Q1515
2SA1576
L.P.F.
R1573 6.8K
C1571 5p
C1566 0.01μ
R729 4.7K
C1546 27p
R1572 20K
C1570 5p
R1570 16K
R1568 16K
R1571 100
R1569 16K
R1567 4.7K
R1566 3.3K
R1564 2K
R1565 2K
R1563 2K
R1562 1K
R1574 100K
R1575 820
R721 1M
C1548 0.047μ
R1576 100
R1577 100
R1578 1M
C1549 0.01μ
C1544 10μ 16V
C1545 0.1μ
R1587 1K
R1586 1K
L1511 FB
L1510 FB
R1561 100
R1558 100
R1560 4.7K
C1542 0.1μ
C1541 0.1μ
L1509 47μH
R725 0
R724 0
R727 0
R714 1K
R1539 33K
C1563 0.01μ
R713 1.3K
C1568 0.01μ
R1584 4.7K
R1589 360K
R1585 12K
C1522 0.22μ 35V
C1543 0.01μ
R719 1K
R1538 1K
R715 27K
C1564 0.01μ
R1552 100
C1589 5p
R1554 100
R1555 100
R1556 100
R1557 100
C1539 10μ 10V
C1540 0.1μ
L1508 FB
L1507 FB
R707 0
R705 0
R703 0
R701 0
R1598 0
R708 0
R706 0
R704 0
R702 0
R1599 0
R1588 100
L1512 FB
R1590 33K
C1533 470p
PCREFS
PCVARS
VDD
XSCRC
SCRC
VSS
PCOUTH
PCBH
PCAH
PCREFH
PCVARH
HCK20
MEMORY THROUGH
H REF.CONT.
HCK10
HCK5
HCK2
HCK1
HBLK
SCK4
HSM
BFM
HSYNC
ODD ⓗ
XVSYNC
CDI 0
CDI 1
CDI 2
CDI 3
CDI 4
CDI 5
CDI 6
CDO 0
CDO 1
CDO 2
CDO 3
CDO 4
CDO 5
CDO 6
YAD-CLK
C A/D 1
C A/D 2
C A/D 3
C A/D 4
C A/D 5
CAD-CLK
XSYNC IN
C D/A 1
C D/A 2
C D/A 3
C D/A 4
C D/A 5
Y D/A 0
Y D/A 1
Y D/A 2
Y D/A 3
Y D/A 4
Y D/A 5
Y D/A 6
Y D/A 7
Y A/D 0
Y A/D 1
Y A/D 2
Y A/D 3
Y A/D 4
Y A/D 5
Y A/D 6
Y A/D 7
FM IN 0
FM IN 1
FM IN 2
FM IN 3
FM OUT 0
FM OUT 1
FM OUT 2
FM OUT 3
FMW-CLK
FMR-CLK
RSTW (FM) ⓗ
RSTR (FM) ⓗ
WRITE ⓗ
READ ⓗ
LM IN 0
LM IN 1
LM IN 2
LM IN 3
LM IN 4
LM IN 5
LM IN 6
LM IN 7
LM OUT 0
LM OUT 1
LM OUT 2
LM OUT 3
LM OUT 4
LM OUT 5
LM OUT 6
LM OUT 7
LMW-CLK
LMR-CLK
RSTW (LM) Ⓛ
RSTR (LM) Ⓛ
DSP-CLOCK IN
DSP-CS
DSP-DATA IN
FRAME REF
DSP V-REF
DIN0
DIN1
DIN2
DIN3
DOUT0
DOUT1
DOUT2
DOUT3
NC
DOUT4
DOUT5
DOUT6
DOUT7
DIN4
DIN5
DIN6
DIN7
LMW-CLK
LMR-CLK
⑤
⑥
⑩
⑪
⑫
⑬
⑭
⑮
⑯
⑰
⑱
⑲
⑳
㉓

505 IC1507 IC1506 IC1508 IC1509


IC1508
TMS4C1050.4DL
1M FIELD MEMORY Ⓗ
IC1509
ZA4010
LINE MEMORY
IC1506
CF38403PJ
DSP GATE ARRAY
IC1510
MN3106S
1280fH (20MHz) VCO
Q1515
2SA1576
L.P.F.
VR1502
2.2K
VCO
DSP 5V
IC1506
IC1508
IC1509
IC1510

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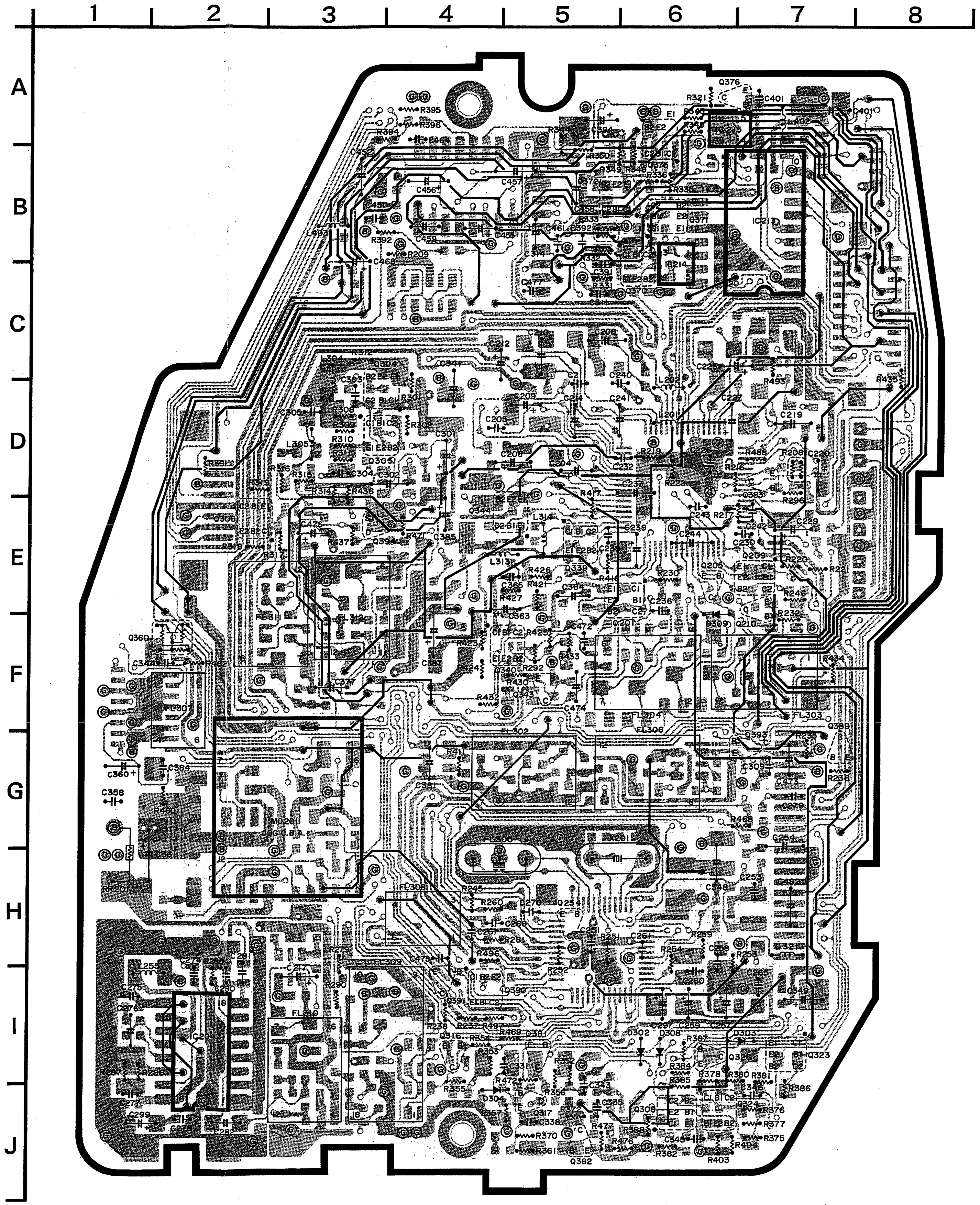
CIRCUIT BOARD DIAGRAM VIDEO C.B.A.

< NOTICE >

VIDEO C.B.A. consists of four layers.
(Soldering, Component, Power Supply and Ground patterns.)
※Through-hole marks on each C. B. A. denote :
○ : Soldering side ⟷ Component side
Ⓖ : Soldering side (Component side) ⟷ Ground
Ⓑ : Soldering side (Component side) ⟷ Power Supply
And, blue lines denote signal patterns which connected in the Ground or Power Supply layer.
Blue (———) : Power Supply layer
Blue (– – – –) : Ground layer

VIDEO C.B.A. (COMPONENT SIDE)

D302	I−6
D303	I−7
D304	J−5
D308	I−6
D309	F−6
IC204	I−2
IC213	B−7
IC214	C−6
IC215	A−6
Q201	E−6
Q205	E−6
Q209	E−7
Q210	E−7
Q254	H−5
Q304	D−4
Q305	D−4
Q306	E−2
Q308	J−6
Q316	I−4
Q317	J−5
Q323	I−7
Q324	J−6
Q326	I−6
Q339	E−5
Q340	F−5
Q343	F−5
Q344	E−5
Q360	F−2
Q370	C−6
Q371	B−6
Q372	B−5
Q375	A−6
Q376	A−6
Q381	I−5
Q382	J−5
Q383	D−7
Q389	G−7
Q390	I−4
Q391	I−4
Q393	G−7
Q394	E−3



1
2
3
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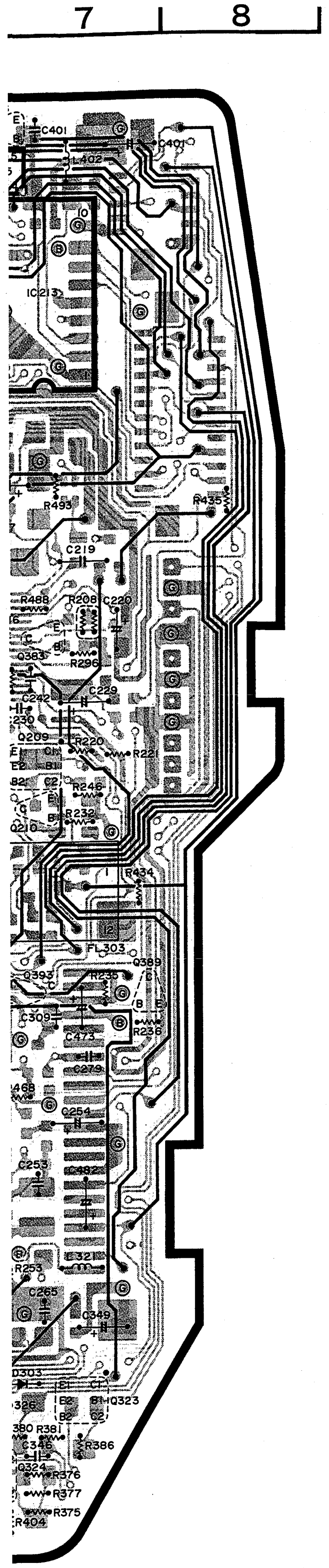
6
7
8
A
B
C
D
E
F
G
H
I
J
IC213
IC214
M0201
FL305
FL303
FL304
FL306
FL302
FL307
FL308
FL309
FL310
L304
L305
L313
L201
L202
L402
C401
R395
R398
Q376
Q360
C358
C360
R480
C209
C210
C212
C240
C241
C219
C243
C229
Q383
R488
C220
R493
R435
C253
C255
C259
C260
C265
C297
Q308
Q317
Q382
R370
R361
R403
R375
R377
R386
Q323
Q326

VIDEO C.B.A. (S

D301	D−6
D305	D−2
D307	F−4
D308	F−2
IC201	D−3
IC202	H−4
IC205	I−7
IC207	C−4
IC208	B−4
IC212	B−3
IC301	H−7
IC303	B−5
Q202	F−4
Q203	H−6
Q204	F−4
Q208	F−5
Q211	B−6
Q212	F−2
Q255	G−3
Q257	J−6
Q302	D−5
Q303	D−6
Q313	J−7
Q315	J−5
Q318	J−4
Q321	G−3
Q327	C−6
Q328	C−5
Q333	G−4
Q334	G−5
Q336	H−8
Q337	I−6
Q338	I−6
Q346	F−6
Q348	E−6
Q349	F−7
Q351	E−6
Q353	F−6
Q356	E−6
Q361	E−4
Q373	B−4
Q374	C−3
Q377	I−5
Q378	J−5
Q380	I−5
Q384	E−4
Q385	E−5
Q386	G−6
Q387	H−6
Q388	F−3
Q392	J−3
TP202	C−4
TP203	D−4
TP204	F−3

TP20
TP20
TP20
TP20
TP21
TP21
TP21
VC20
VR20
VR20
VR20
VR20
VR20
VR20
VR21
VR30
VR30
VR30
VR30
VR30
VR30
VR30
VR31

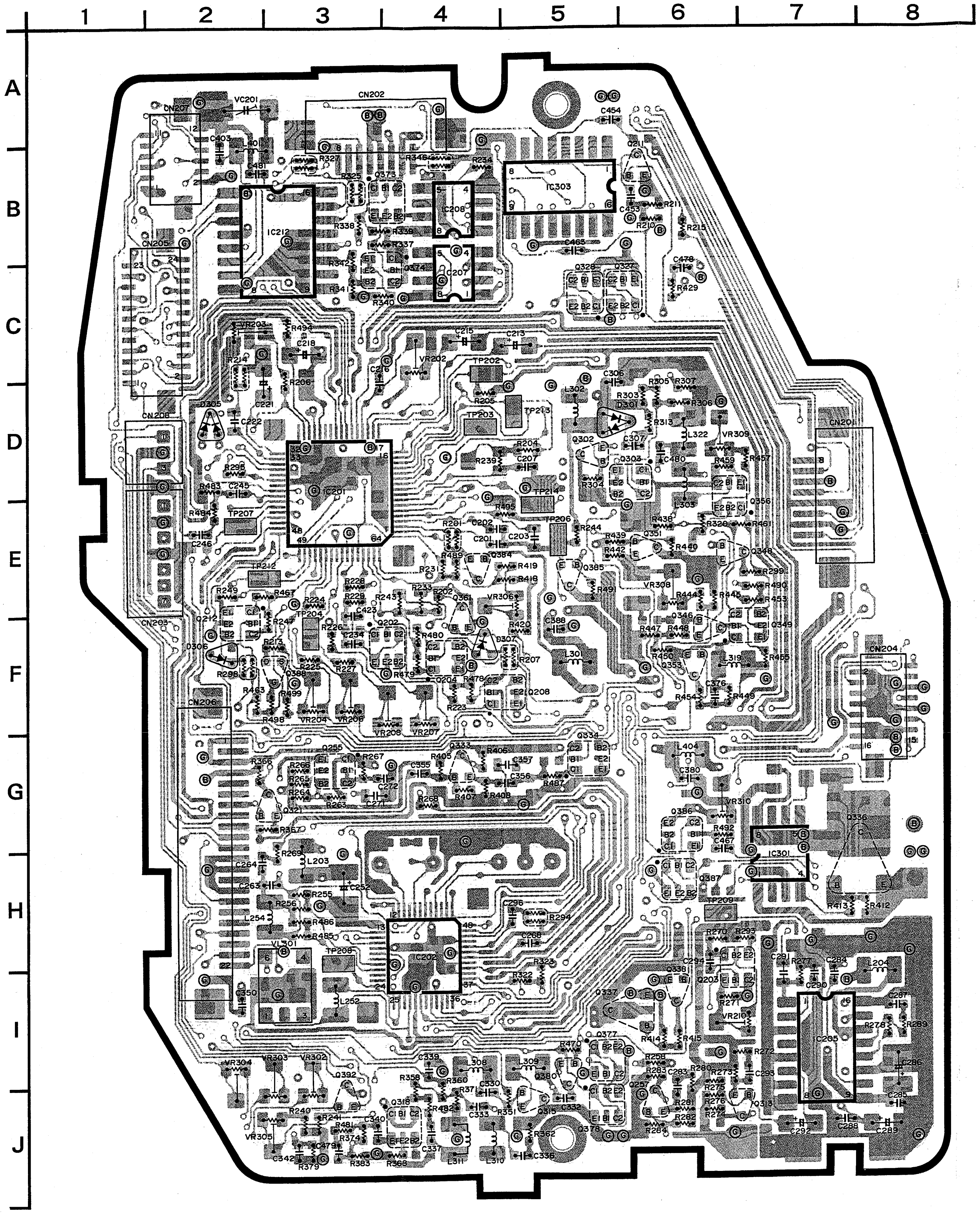
01 Nov. 1990


7
8
C401
IC213
R435
R493
C219
R208
C220
R488
R296
C242
C259
Q209
R220
R246
R232
R434
FL303
Q393
C309
C473
R238
C279
C254
C253
C482
C265
R253
Q349
D303
Q323
R381
R386
R377
R376
R375
R404

VIDEO C.B.A.(SOLDERING SIDE)

D301	D−6
D305	D−2
D307	F−4
D308	F−2
IC201	D−3
IC202	H−4
IC205	I−7
IC207	C−4
IC208	B−4
IC212	B−3
IC301	H−7
IC303	B−5
Q202	F−4
Q203	H−6
Q204	F−4
Q208	F−5
Q211	B−6
Q212	F−2
Q255	G−3
Q257	J−6
Q302	D−5
Q303	D−6
Q313	J−7
Q315	J−5
Q318	J−4
Q321	G−3
Q327	C−6
Q328	C−5
Q333	G−4
Q334	G−5
Q336	H−8
Q337	I−6
Q338	I−6
Q346	F−6
Q348	E−6
Q349	F−7
Q351	E−6
Q353	F−6
Q356	E−6
Q361	E−4
Q373	B−4
Q374	C−3
Q377	I−5
Q378	J−5
Q380	I−5
Q384	E−4
Q385	E−5
Q386	G−6
Q387	H−6
Q388	F−3
Q392	J−3
TP202	C−4
TP203	D−4
TP204	F−3

TP206	E−5
TP207	E−2
TP208	H−3
TP209	H−6
TP212	E−2
TP213	D−5
TP214	E−5
VC201	A−2
VR202	C−4
VR203	C−2
VR204	F−3
VR206	F−3
VR207	F−4
VR208	F−4
VR210	I−6
VR302	I−3
VR303	I−3
VR304	I−2
VR305	J−3
VR306	E−5
VR308	E−6
VR309	D−6
VR310	G−6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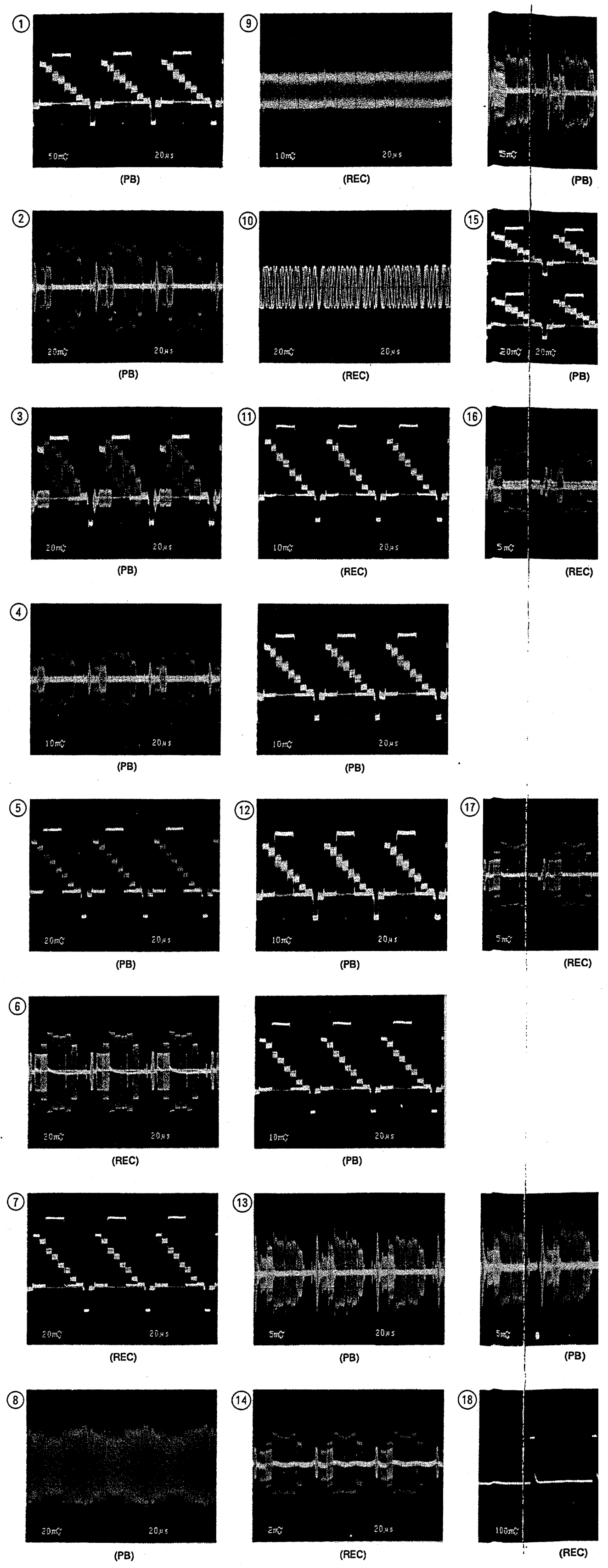
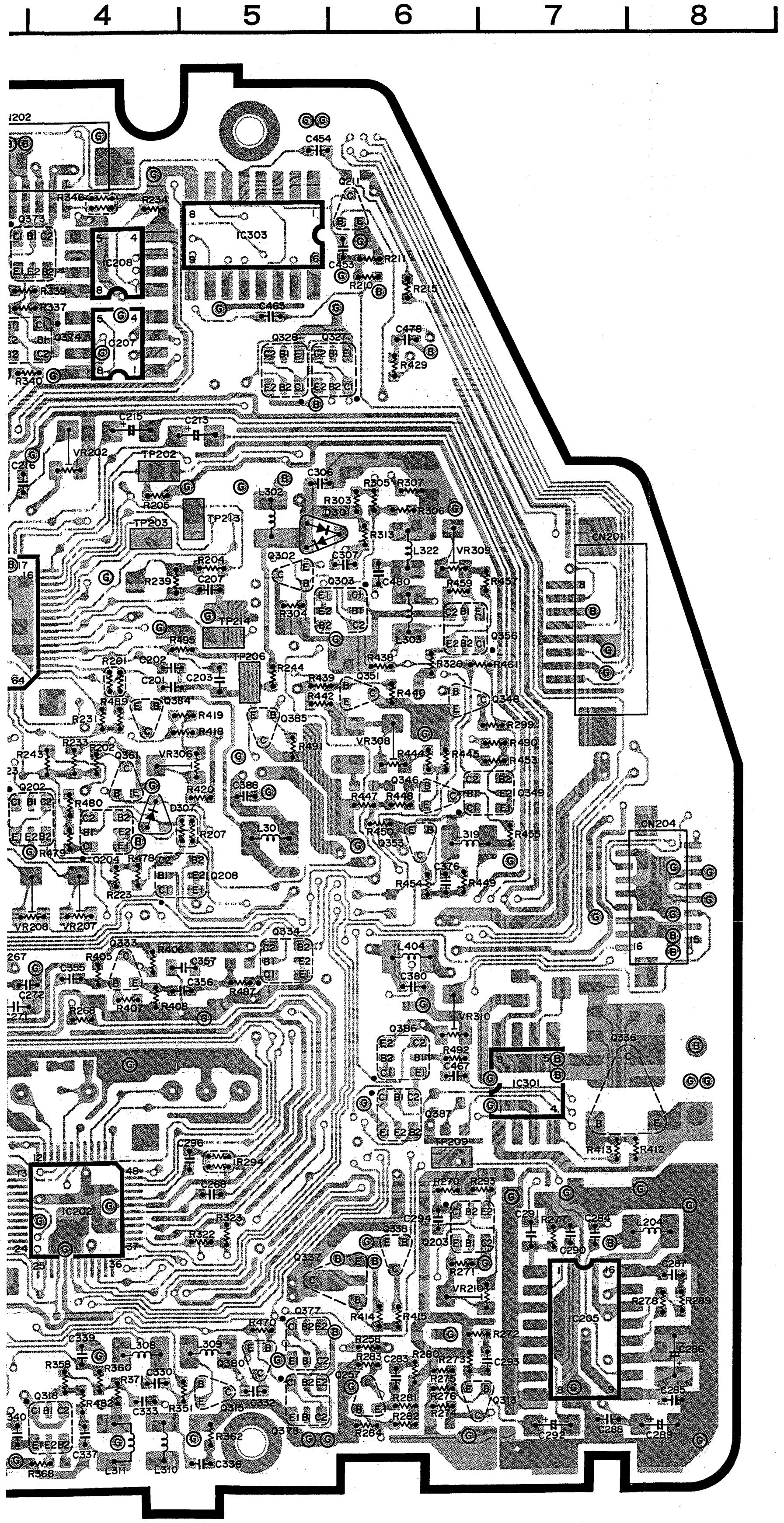
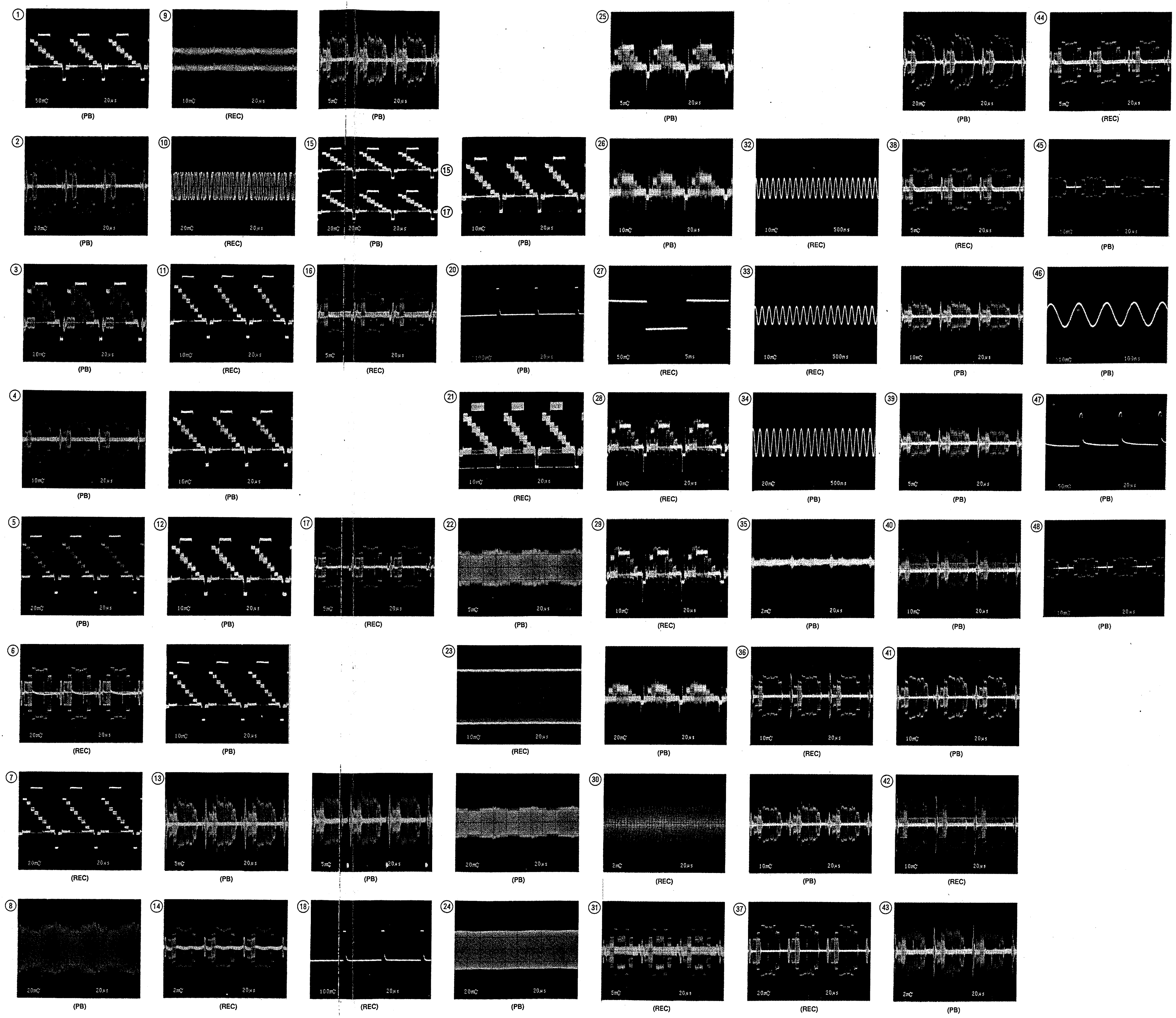
A
B
C
D
E
F
G
H
I
J
CN207
VC201
CN202
C454
IC212
IC208
IC207
IC303
CN205
CN206
CN203
CN201
CN204
IC201
IC202
IC301
IC205
VR202
VR203
VR204
VR206
VR207
VR208
VR210
VR302
VR303
VR304
VR305
VR306
VR308
VR309
VR310
TP202
TP203
TP204
TP206
TP207
TP208
TP209
TP212
TP213
TP214
D301
D305
D306
Q336

SIGNAL WAVEFORMS





SIGNAL WAVEFORMS



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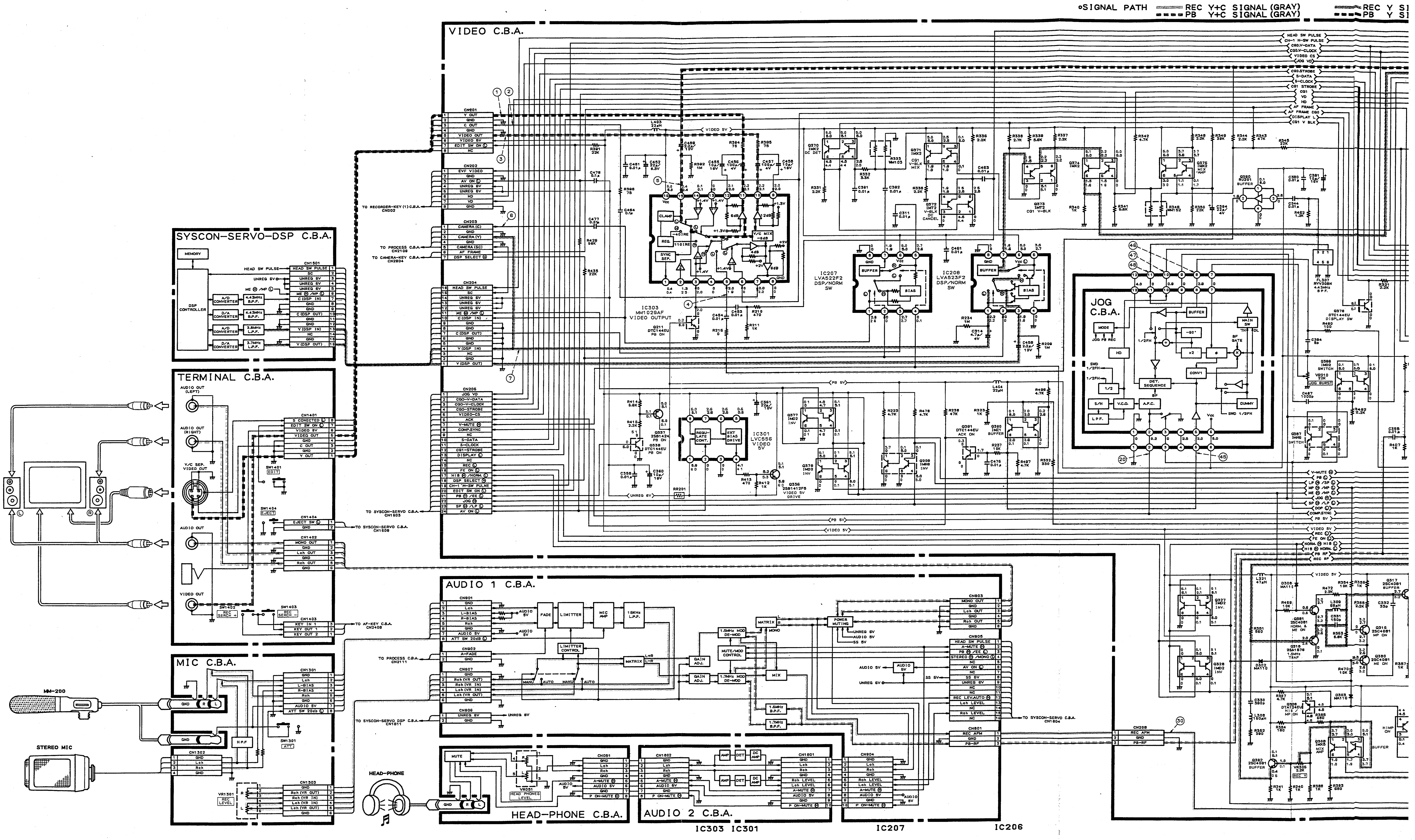
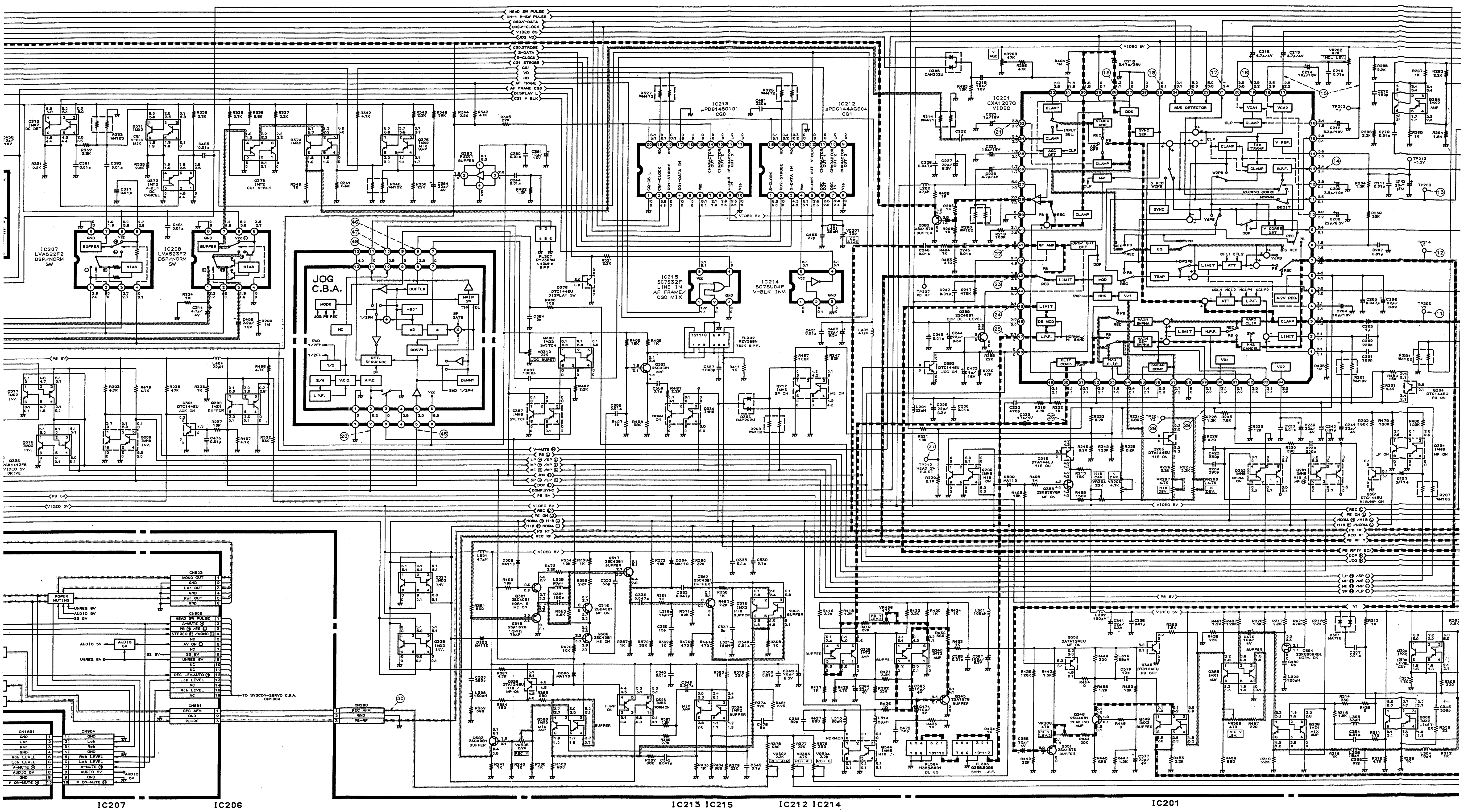
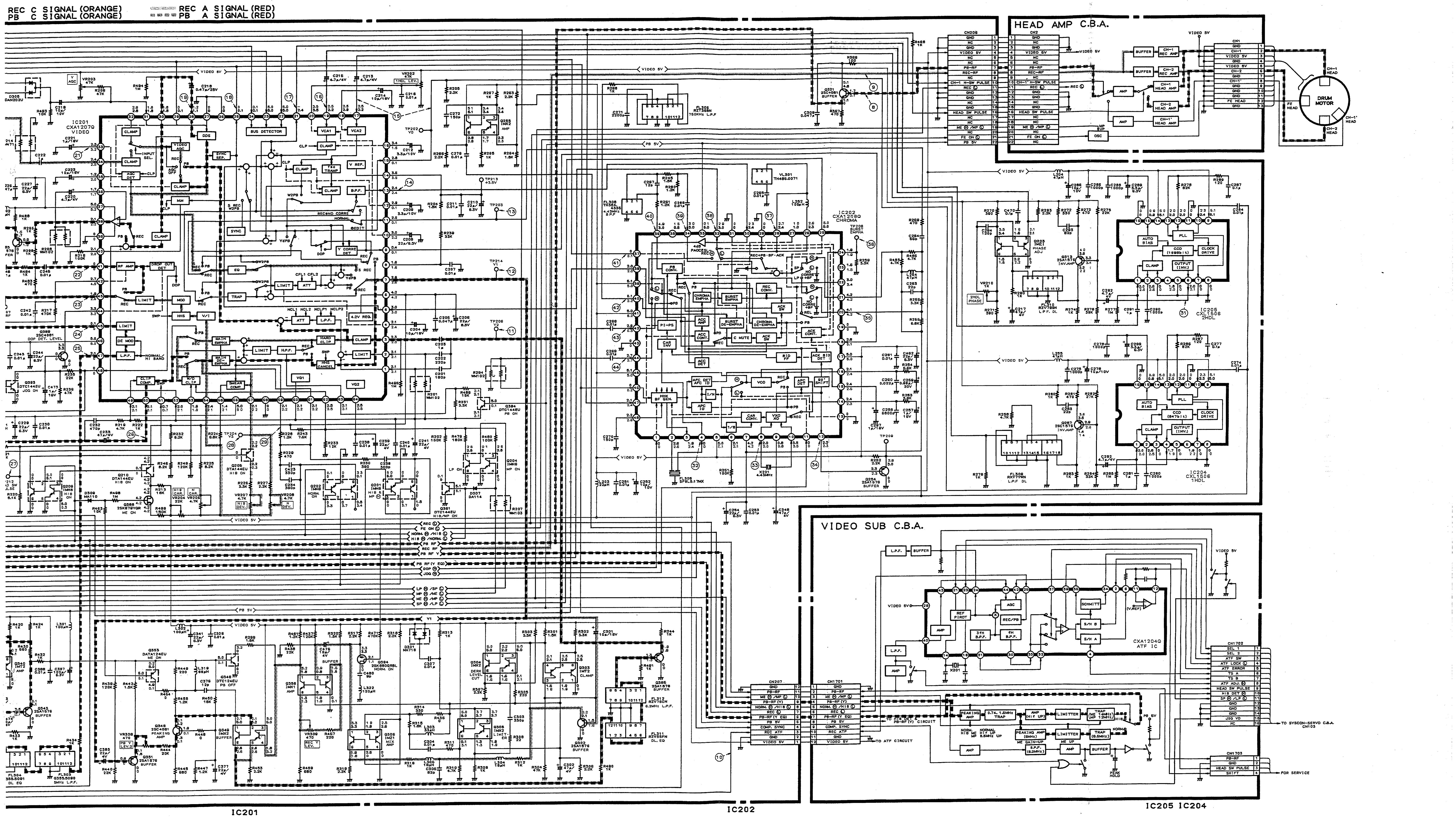
SCHEMATIC DIAGRAM VIDEO C.B.A.



SIGNAL PATH
REC Y+C SIGNAL (GRAY)
PB Y+C SIGNAL (GRAY)
REC Y SI
PB Y SI
VIDEO C.B.A.
SYSCON-SERVO-DSP C.B.A.
TERMINAL C.B.A.
MIC C.B.A.
AUDIO 1 C.B.A.
AUDIO 2 C.B.A.
HEAD-PHONE C.B.A.
JOG C.B.A.
IC303 MM1029AF VIDEO OUTPUT
IC301 LVC556 VIDEO 5V
IC207 LVA522F2 DSP/NORM SW
IC206 LVA523F2 DSP/NORM SW
MM-200
STEREO MIC
HEAD-PHONE
IC303 IC301
IC207
IC206

∘SIGNAL PATH
REC Y+C SIGNAL (GRAY) / PB Y+C SIGNAL (GRAY)
REC Y SIGNAL (BLUE) / PB Y SIGNAL (BLUE)
REC Y H18 SIGNAL (BLUE) / PB Y H18 SIGNAL (BLUE)
REC C SIGNAL (ORANGE) / PB C SIGNAL (ORANGE)
REC A SIGNAL (RED) / PB A SIGNAL (RED)


IC207
LVA522F2
DSP/NORM
SW
IC208
LVA523F2
DSP/NORM
SW
JOG
C.B.A.
IC213
μPD6145G101
CG0
IC212
μPD6144AG604
CG1
IC215
SC7S32F
LINE IN
AF FRAME/
CG0 MIX
IC214
SC7SU04F
V-BLK INV.
IC201
CXA1207Q
VIDEO
FL307
RYV3BN
4.43MHz
B.P.F.
FL302
RZV3BBN
752K B.P.F.
FL304
H355.5591
DL EQ
FL303
Q355.5090
5MHz L.P.F.
CN803
CN805
CN801
CN804
CN1801
CN208
TO SYSCON-SERVO C.B.A.
CN1604
POWER
MUTING
AUDIO 5V
UNREG 5V
PB 5V
VIDEO 5V
IC207
IC206
IC213 IC215
IC212 IC214
IC201


REC C SIGNAL (ORANGE)
PB C SIGNAL (ORANGE)
REC A SIGNAL (RED)
PB A SIGNAL (RED)
IC201 CXA1207Q VIDEO
IC202 CXA1208Q CHROMA
HEAD AMP C.B.A.
DRUM MOTOR
IC205 CXL1506 2HDL
IC204 CXL1506 1HDL
VIDEO SUB C.B.A.
CXA1204Q ATF IC
TO SYSCON-SERVO C.B.A. CN103
FOR SERVICE
IC201
IC202
IC205 IC204

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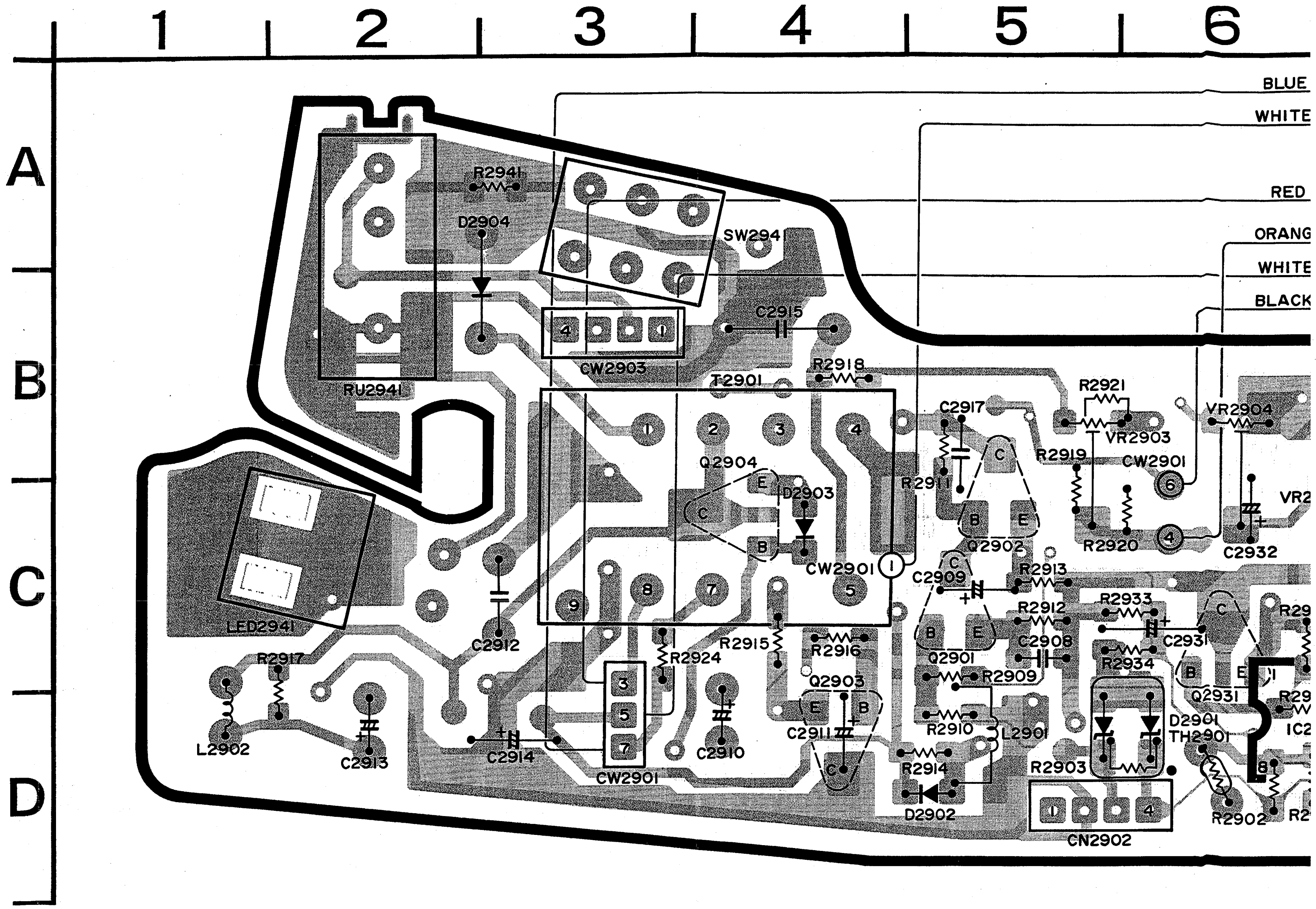
CIRCUIT BOARD DIAGRAM EVF C.B.A.

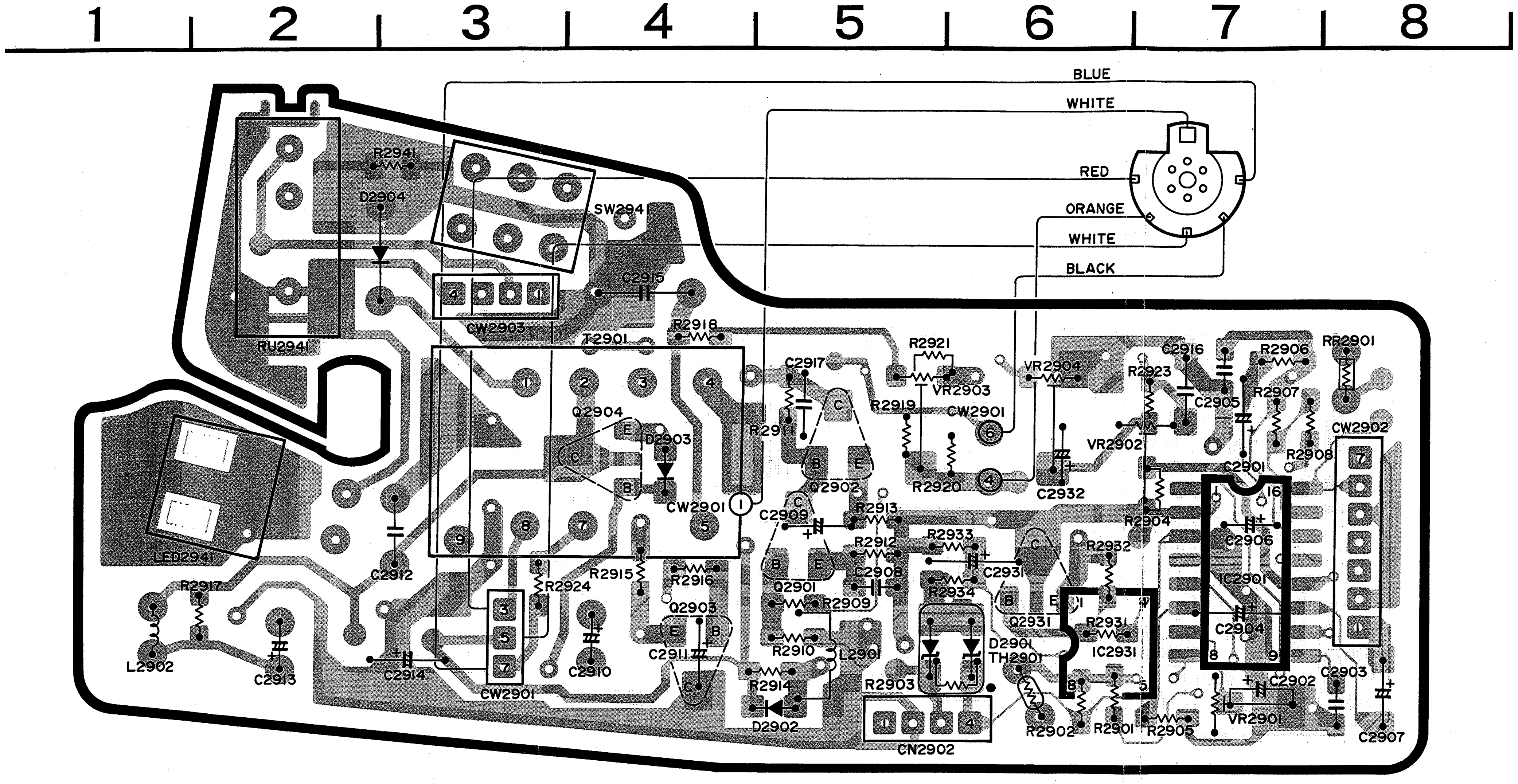
EVF C.B.A.

D2901	D-6
D2902	D-5
D2903	C-4
D2904	B-3
IC2901	C-7
IC2931	D-6
Q2901	C-5
Q2902	C-5
Q2903	D-4
Q2904	C-4
Q2931	C-6
VR2901	D-7
VR2902	C-7
VR2903	B-5
VR2904	B-6



1
2
3
4
5
6
A
B
C
D
BLUE
WHITE
RED
ORANG
WHITE
BLACK
R2941
D2904
SW294
CW2903
C2915
RU2941
R2918
T2901
R2921
VR2904
C2917
VR2903
R2919
CW2901
R2911
Q2904
D2903
Q2902
R2920
C2932
VR2
LED2941
C2912
CW2901
C2909
R2913
R2912
R2933
C2931
R2915
R2916
C2908
R2917
R2924
Q2901
R2934
Q2903
R2909
Q2931
L2902
C2913
C2914
C2910
C2911
R2910
L2901
D2901
TH2901
IC2
R2914
R2903
CW2901
D2902
R2902
CN2902

IAGRAM EVF C.B.A.


1
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5
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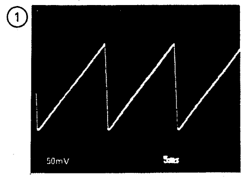
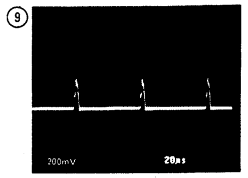
7
8
BLUE
WHITE
RED
ORANGE
WHITE
BLACK
R2941
D2904
SW294
C2915
CW2903
RU2941
T2901
R2918
R2921
VR2903
VR2904
R2923
C2916
R2906
RR2901
C2905
R2907
C2917
R2919
CW2901
Q2904
D2903
VR2902
R2908
CW2902
Q2902
R2920
C2932
C2901
16
C2909
R2913
R2904
C2906
R2912
R2933
R2932
C2908
C2931
LED2941
C2912
R2915
R2924
R2916
Q2901
R2934
Q2931
IC2901
R2917
Q2903
R2909
R2931
C2904
L2902
C2911
R2910
L2901
D2901
TH2901
IC2931
8
9
C2913
C2914
C2910
R2914
R2903
C2902
C2903
D2902
R2902
R2901
R2905
VR2901
C2907
CN2902
C
B
E

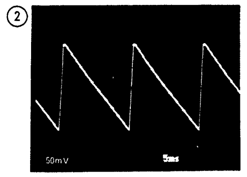
SIGNAL WAVEFORMS



(REC)



(REC)



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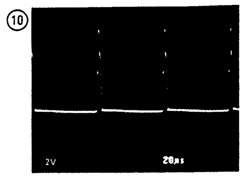
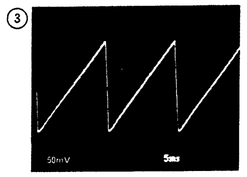
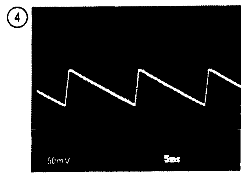


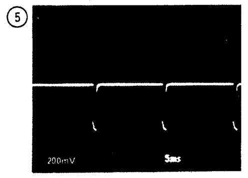
(REC)



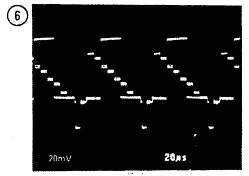
(REC)



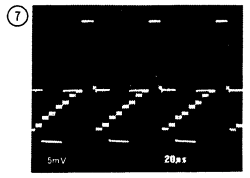
(REC)



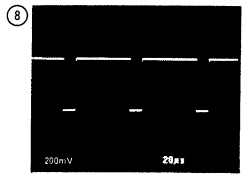
(REC)



(REC)



(REC)



(REC)

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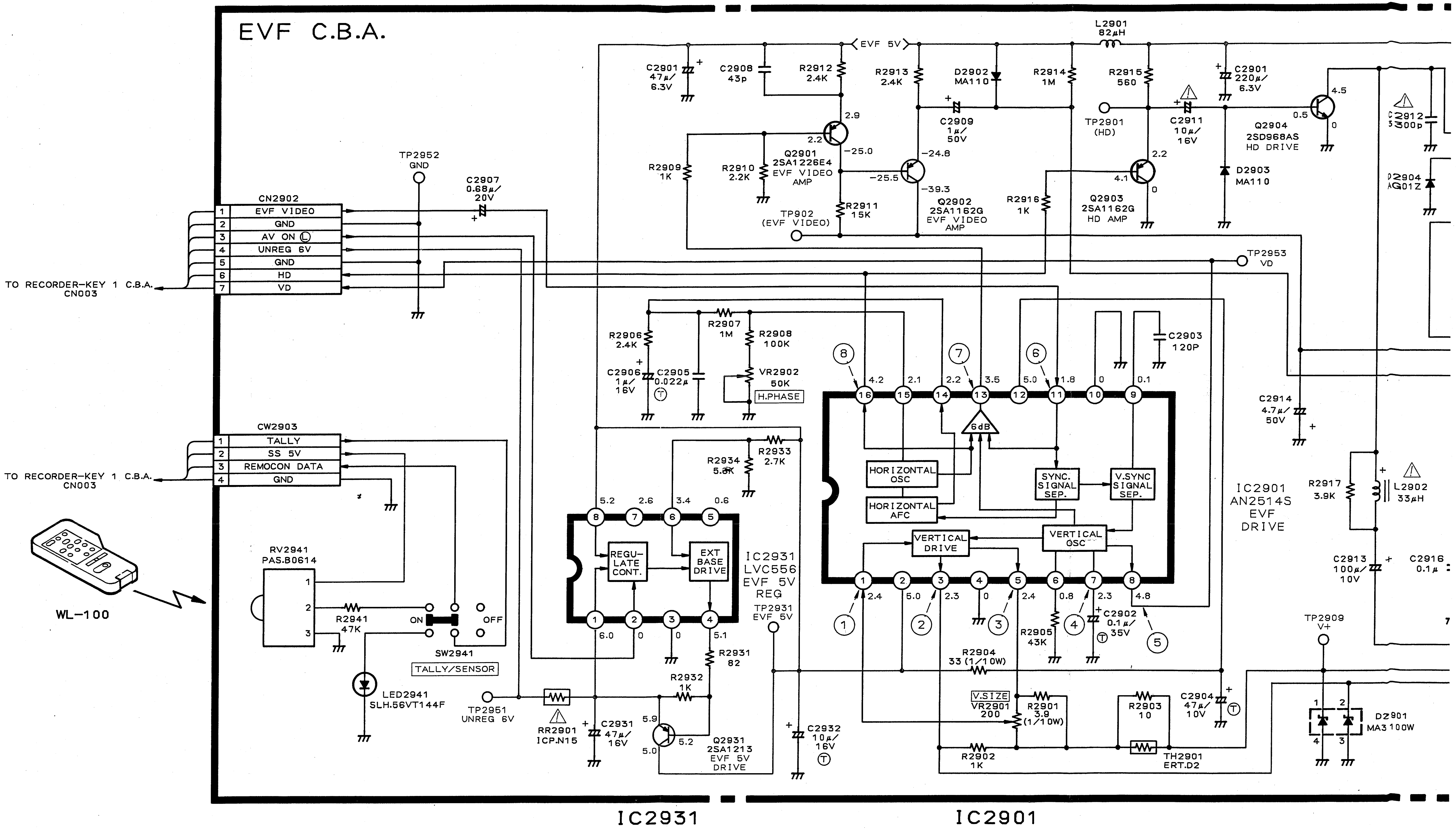
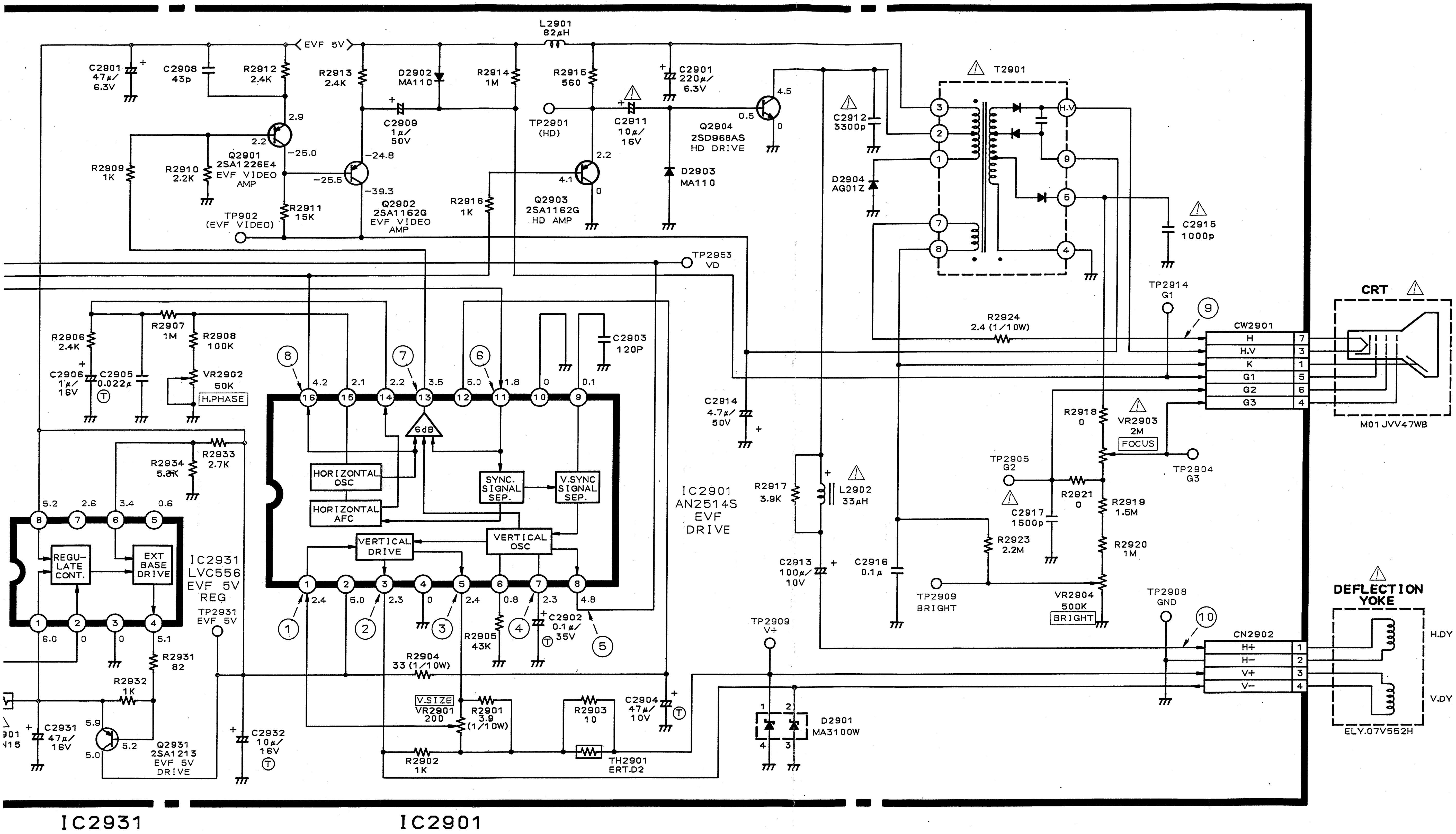
SCHEMATIC DIAGRAM EVF C.B.A.


EVF C.B.A.
TO RECORDER-KEY 1 C.B.A. CN003
CN2902
1 EVF VIDEO
2 GND
3 AV ON Ⓛ
4 UNREG 6V
5 GND
6 HD
7 VD
TP2952 GND
C2907 0.68µ/ 20V
TO RECORDER-KEY 1 C.B.A. CN003
CW2903
1 TALLY
2 SS 5V
3 REMOCON DATA
4 GND
WL-100
RV2941 PAS.B0614
R2941 47K
SW2941 TALLY/SENSOR
ON
OFF
LED2941 SLH.56VT144F
TP2951 UNREG 6V
RR2901 ICP.N15
C2931 47µ/ 16V
R2932 1K
Q2931 2SA1213 EVF 5V DRIVE
R2931 82
REGU-LATE CONT.
EXT BASE DRIVE
IC2931 LVC556 EVF 5V REG
TP2931 EVF 5V
R2934 5.6K
R2933 2.7K
C2932 10µ/ 16V
EVF 5V
C2901 47µ/ 6.3V
C2908 43p
R2912 2.4K
Q2901 2SA1226E4 EVF VIDEO AMP
R2909 1K
R2910 2.2K
R2911 15K
TP902 (EVF VIDEO)
R2913 2.4K
D2902 MA110
C2909 1µ/ 50V
Q2902 2SA1162G EVF VIDEO AMP
R2914 1M
L2901 82µH
R2915 560
TP2901 (HD)
C2911 10µ/ 16V
Q2903 2SA1162G HD AMP
R2916 1K
C2901 220µ/ 6.3V
D2903 MA110
Q2904 2SD968AS HD DRIVE
C2912 300p
D2904 MA01Z
TP2953 VD
R2906 2.4K
R2907 1M
R2908 100K
C2906 1µ/ 16V
C2905 0.022µ
VR2902 50K H.PHASE
C2903 120P
6dB
HORIZONTAL OSC
HORIZONTAL AFC
SYNC. SIGNAL SEP.
V.SYNC SIGNAL SEP.
VERTICAL DRIVE
VERTICAL OSC
IC2901 AN2514S EVF DRIVE
R2905 43K
C2902 0.1µ/ 35V
R2904 33 (1/10W)
V.SIZE VR2901 200
R2901 3.9 (1/10W)
R2902 1K
R2903 10
TH2901 ERT.D2
C2904 47µ/ 10V
C2914 4.7µ/ 50V
R2917 3.9K
L2902 33µH
C2913 100µ/ 10V
C2916 0.1µ
TP2909 V+
DZ901 MA3100W
IC2931
IC2901



EVF 5V
L2901
82μH
C2901
47μ/
6.3V
C2908
43p
R2912
2.4K
R2913
2.4K
D2902
MA110
R2914
1M
R2915
560
C2901
220μ/
6.3V
T2901
C2909
1μ/
50V
TP2901
(HD)
C2911
10μ/
16V
Q2904
2SD968AS
HD DRIVE
C2912
3300p
D2904
AG01Z
Q2901
2SA1226E4
EVF VIDEO
AMP
R2909
1K
R2910
2.2K
R2911
15K
TP902
(EVF VIDEO)
Q2902
2SA1162G
EVF VIDEO
AMP
R2916
1K
Q2903
2SA1162G
HD AMP
D2903
MA110
C2915
1000p
H.V
TP2953
VD
TP2914
G1
CRT
R2924
2.4 (1/10W)
CW2901
H
H.V
K
G1
G2
G3
M01JVV47WB
R2906
2.4K
R2907
1M
R2908
100K
VR2902
50K
H.PHASE
C2906
1μ/
16V
C2905
0.022μ
C2903
120P
6dB
C2914
4.7μ/
50V
R2918
0
VR2903
2M
FOCUS
TP2904
G3
TP2905
G2
R2921
0
R2919
1.5M
C2917
1500p
R2920
1M
R2923
2.2M
R2917
3.9K
L2902
33μH
HORIZONTAL
OSC
HORIZONTAL
AFC
SYNC.
SIGNAL
SEP.
V.SYNC
SIGNAL
SEP.
VERTICAL
DRIVE
VERTICAL
OSC
IC2901
AN2514S
EVF
DRIVE
R2934
5.3K
R2933
2.7K
REGU-
LATE
CONT.
EXT
BASE
DRIVE
IC2931
LVC556
EVF 5V
REG
TP2931
EVF 5V
C2913
100μ/
10V
C2916
0.1μ
TP2909
BRIGHT
VR2904
500K
BRIGHT
TP2908
GND
DEFLECTION
YOKE
H.DY
V.DY
CN2902
H+
H−
V+
V−
ELY.07V552H
R2905
43K
C2902
0.1μ/
35V
R2904
33 (1/10W)
R2931
82
R2932
1K
C2931
47μ/
16V
Q2931
2SA1213
EVF 5V
DRIVE
C2932
10μ/
16V
V.SIZE
VR2901
200
R2901
3.9
(1/10W)
R2903
10
C2904
47μ/
10V
TH2901
ERT.D2
R2902
1K
TP2909
V+
D2901
MA3100W
IC2931
IC2901

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